SATBAYEV
UNIVERSITY

## Institute of Automation and Information Technology
## Department of Cybersecurity, Information Processing and Storage

## EDUCATIONAL PROGRAM
## 7M06108- «Management information systems»

**шифр и наименование образовательной программы**

Code and classification of the field of education: 7M06 «Information and communication technologies»
Code and classification of training directions: 7M061 «Information and communication technologies»
Group of educational programs: M094 « Information technologies»
Level based on NQF: 7
Level based on IQF: 7
Study period: 1,5 years
Amount of credits: 90

**Алматы 2025**

F KazNRTU 703-05 Educational program

Educational program 7M06108 «Management of information systems» was approved at the meeting of K.I.Satbayev KazNRTU Academic Council
Minutes №10 dated «_06__» __03__ 2025.

Was reviewed and recommended for approval at the meeting of K.I.Satbayev KazNRTU Educational and Methodological Council
Minutes №3_dated «_20__» ____12_____ 2024.

Educational program 7M06108 «Management of information systems» was developed by Academic committee based on direction 7M061 «Information and communication technologies».

| Ф.И.О. | Last name first name patronymic | Post | Place of work | Signature |
|---|---|---|---|---|
| **Chairman of the Academic Committee:** | | | | |
| Pokusov Viktor Vladimirovich | | Chairman | Kazakhstan Information Security Association | |
| **Academic staff:** | | | | |
| Aitkhozhaeva Evgeniya Zhamalkhanovna | Candidate of Technical Sciences, Associate Professor | Professor | NJSC "KazNRTU named after K.I. Satpaev" | |
| Rakhmetulayeva Sabina Batyrkhanovna | PhD | Professor | NJSC "KazNRTU named after K.I. Satpaev" | |
| Satybaldiyeva Ryshan Zhakanovna | Candidate of Technical Sciences, | Associate Professor | NJSC "KazNRTU named after K.I. Satpaev" | |
| Serbin Vasily Valerievich | Candidate of Technical Sciences, | Associate Professor | NJSC "KazNRTU named after K.I. Satpaev" | |
| Zhumagaliev Birzhan Izimovich | Candidate of Technical Sciences, Associate Professor | Associate Professor | NJSC "KazNRTU named after K.I. Satpaev" | |
| Alimseitova Zhuldyz Keneskhanovna | Doctor of PhD | Associate Professor | NJSC "KazNRTU named after K.I. Satpaev" | |
| Khalich Ibragimovna Yubuzova | Doctor of PhD | Associate Professor | NJSC "KazNRTU named after K.I. Satpaev" | |
| **Representatives of employers:** | | | | |
| Mamyrbayev Orken Zhumazhanovich | Doctor of PhD Associate Professor | Deputy Director General | RSE "Institute of Information and Computing Technologies" | |
| Konysbayev Amret Tuyakuly | Candidate of Physico-mathematical Sciences | President | Association of Innovative Companies of the FEZ "PIT" | |
| Batyrgaliev Askhat Bolatkhanovich | Doctor of PhD Associate Professor | The border service of the National Security Committee, counterintelligence | Military unit № 01068, | |
| **Teaching staff:** | | | | |
| Abilkayyrova Alina Serikkyzy | | 3rd year student | NJSC "KazNRTU named after K.I. Satpaev" | |
| Elle Venera | | Student 1st year, doctoral studies | NJSC "KazNRTU named after K.I. Satpaev" | |

F KazNRTU 703-05 Educational program

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## List of abbreviations and designations

EP Educational program
BC – basic competencies
PC – professional competencies
LO – learning outcomes
MOOC – massive open online courses
NQF – National Qualifications Framework
IQF – Industry Qualifications Framework

## 1. Description of educational program

The Master's degree program is structured according to the principle of modular training. The structure of the Master's degree program is formed from various types of educational and scientific work that determine the content of education.

The Master's degree program contains:

1) theoretical training, including the study of cycles of basic and core disciplines;

2) practical training of undergraduates: various types of practices, professional internships;

3) research work, including the implementation of a master's thesis,

4) intermediate and final attestations

## 2. Purpose and objectives of educational program

**Purpose of EP:** Training highly qualified specialists who can solve of tasks for receiving, storing, processing, analyzing, presenting and transmitting information using modern information and communication technologies.

**Tasks of EP**:

1. Setting goals and objectives of the designed information systems based on the analysis of the information needs of the organization.

2. Selection of modern technologies for designing and developing IT solutions.

3. Application of effective principles and methods of IT resource management.

4. The use of mathematical methods for modeling business processes of the organization, the development of algorithms for their implementation in information systems for various purposes.

5. Develop IP applications and algorithms for the functioning of IP modules based on domain analysis.

6. Training of technical staff on the development and maintenance of information systems and their subsystems

## 3. Requirements for evaluating the educational program learning outcomes

The educational program was developed in accordance with the State mandatory Standards of higher and Postgraduate Education, approved by the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2 (registered in the Register of State Registration of

Regulatory Legal Acts under No. 28916) and reflects the learning outcomes on the basis of which curricula are developed (working curricula, individual curricula of students) and working curricula in disciplines (syllabuses). Mastering disciplines of at least 10% of the total volume of credits of the educational program using MOOC on the official platform

https://polytechonline.kz/cabinet/login/index.php /, as well as through the study of disciplines through the international educational platform Coursera https://www.coursera.org /.

Evaluation of learning outcomes is carried out according to the developed test tasks within the educational program in accordance with the requirements of the state mandatory standard of higher and postgraduate education.

When evaluating learning outcomes, uniform conditions and equal opportunities are created for students to demonstrate their knowledge, skills and abilities.

When conducting an interim certification in an online form, online proctoring is used.

## 4. Passport of educational program
## 4.1. General information

| № | Field name | Comments |
|---|---|---|
| 1 | Code and classification of the field of education | 7M06 «Information and communication technologies» |
| 2 | Code and classification of training directions | 7M061 «Information and communication technologies» |
| 3 | Educational program group | M094 « Information technologies» |
| 4 | Educational program name | 7M06108 - "Management of Information Systems" |
| 5 | Short description of educational program | The Master's degree program in the profile direction implements educational programs of postgraduate education for the training of managerial personnel with in-depth professional training. The program describes and regulates the procedure for training highly qualified specialists in the field of information management using modern information and communication technologies for all spheres of the national economy of Kazakhstan, capable of solving the tasks of effective management of both elements, processes and resources of the information system itself and other elements, processes and resources of the enterprise. The main functions of the professional activity of masters in the direction of "Information and communication technologies" are design, development, analysis, testing, implementation of information systems for various purposes and their components, information management support using modern technologies |
| 6 | Purpose of EP | Training highly qualified specialists who can solve of tasks for receiving, storing, processing, analyzing, presenting and transmitting information using modern information and communication technologies. |
| 7 | Type of EP | New EP |
| 8 | The level based on NQF | 7 |
| 9 | The level based on IQF | 7 |
| 10 | Distinctive features of EP | No |
| 11 | List of competencies of educational program | A graduate who has mastered master's degree programs must have the following general professional competencies: - the ability to apply in practice the knowledge of fundamental and applied sections of disciplines that determine the |

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| | | orientation (profile) of the master's degree program;<br>– the ability to formulate research goals independently, establish the sequence of solving professional tasks;<br>– the ability to professionally select and creatively use modern scientific and technical equipment to solve applied problems;<br>– the ability to critically analyze, present, defend, discuss and disseminate the results of their professional activities;<br>– proficiency in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles;<br>– willingness to lead a team in the field of their professional activities, tolerantly perceiving social, ethnic, confessional and cultural differences;<br>– readiness to communicate orally and in writing in a foreign language to solve the tasks of professional activity;<br>A graduate who has mastered the master's degree program must have professional competencies corresponding to the types of professional activities that the master's degree program is focused on:scientific and production activities<br>: - the ability to independently carry out production and scientific–production, laboratory and interpretative work in solving practical problems;<br>– the ability to professionally operate modern laboratory equipment and devices in the field of the master's degree program;<br>– the ability to use modern methods of processing and interpreting complex information to solve production problems; project activity:<br>– the ability to independently compile and submit projects of research and scientific-production works in the field of information security;<br>– readiness to design complex research and scientific production works in solving professional tasks; organizational and managerial activities:<br>– readiness to use practical skills in organizing and managing research and scientific-production work in solving professional tasks;<br>- readiness for the practical use of regulatory documents in the planning and organization of scientific and production work in the field of information security |
| 12 | Learning outcomes of educational program | **ON1**. Be fluent in a foreign language at a professional level that allows you to conduct scientific research. Beable to critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena.<br>**ON2**. Apply the methodology, models, methods, development and design tools for the development of information systems.<br>**ON3**. Use project management methods in IT<br>**ON4**. Organize (structure) knowledge in expert systems, apply artificial intelligence methods. Design intelligent systems.<br>**ON5**. Design an information model of the subject area, use the methods of administration of multi-user databases.<br>**ON6**. Apply the basic principles of using big data in enterprise architecture and the main methods of analytical processing and storage of big data.<br>**ON7**. Build models of processes occurring in various systems. Analyze the processes in the organization and the benefits of |

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| | | cloud technologies in modern business to solve professional problems. Apply the tools of this technology.<br>**ON8**. Be fluent in a foreign language at a professional level that allows you to conduct scientific research for partnership in the interests of sustainable development. Be able to critically analyze existing concepts, theories, and approaches to analyzing processes and phenomena. |
| 13 | Education form | Full-time, online |
| 14 | Period of training | 1,5 years |
| 15 | Amount of credits | 90 |
| 16 | Languages of instruction | Kazakh, Russian |
| 17 | Academic degree awarded | Master of Technical Sciences |
| 18 | Developer(s) and authors | Shukaev D.N. Satybaldieva R.J. Zhumagaliev B.I. Baymataeva S.M. |

**4.2. Relationship between the achievability of the formed learning outcomes based on educational program and academic disciplines**

| № | Name of the discipline | Brief description of the discipline | Number of credits | Generated learning outcomes (codes) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ON1 | ON2 | ON3 | ON4 | ON5 | ON6 | ON7 | ON8 |
| The cycle of basic disciplines<br>The university component | | | | | | | | | | | |
| 1 | Foreign language (professional) | The purpose of the course is to improve and develop foreign language communication skills in the professional and academic fields. Course content: general principles of professional and academic intercultural oral and written communication using modern pedagogical technologies (round table, debates, discussions, analysis of professionally oriented cases, design). | 2 | | | | | | | | v |
| 2 | Management | The purpose of the discipline is to form a scientific understanding of management as a type of professional activity; to master the general theoretical principles of managing socio-economic systems; to master the skills and practical solutions to management problems; to study the world experience of management, as well as the specifics of Kazakhstani management, and to teach students how to solve practical issues related to managing various aspects of organizations. | 2 | | | v | v | | | | |
| 3 | Psychology of management | Objective: To acquire skills in making strategic and managerial decisions, taking into account the psychological characteristics of the individual and the team. Content: the modern role and content of psychological aspects in management activities, methods of improving psychological literacy, the composition and structure of management activities, both at the local and foreign levels, the psychological peculiarity of modern managers. | 2 | | v | v | | | | | v |
| The cycle of basic disciplines<br>Component of choice | | | | | | | | | | | |
| 4 | Analysis and modeling and design of information systems | In the process of studying the discipline, undergraduates should: know modern methods of analyzing information systems and processes, an | 4 | v | v | | | v | | | |

| | | apparatus for simulating random and non-stationary parameters of complex systems; be able to apply intelligent simulation tools, computer modeling technology; have skills in organizing computational experiments and using an object-oriented apparatus for analyzing and modeling information processes. | | | | | | | | | | | |
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| 5 | Methods and applications of computer modeling | Methods modeling of parameters and processes with specified or predicted patterns of their values. The study of typical modeling schemes for processes occurring in various systems. Application of computer modeling methods in production, logistics, organizational, economic and financial systems, taking into account instability and conflict situations. | 4 | | | v | | v | | | | | | |
| 6 | Artificial intelligence methods | The course is a comprehensive study of a class of machine learning algorithms such as convolutional, recurrent, and recursive neural networks. The discipline examines the methods of artificial intelligence, the principles of organization and use of intelligent information technologies. | 5 | | | v | v | | | | | | | |
| 7 | Web mining | The course is aimed at developing undergraduates' theoretical knowledge and practical skills for analyzing data obtained from the Internet and interpreting the results obtained. The course examines the basic data analysis methods used to work with Internet data, including all stages: initial, preprocessing, modeling, and model analysis. Working in the R environment with packages for analyzing Internet data. The use of methods for applying data mining algorithms in the search for patterns of user behavior | 5 | | v | | | | v | | | | | |
| **The cycle of profile disciplines** <br> **The university component** | | | | | | | | | | | | | | |
| 8 | Architecture of information systems (Coursera) | The purpose of the course is to master and systematize theoretical knowledge in the field of architectures of modern information systems (IS). The content of the discipline includes the classification of IP architecture, principles of IP construction, models and resources of information systems, the main components of information systems. During the course, students will apply information system architecture development | 5 | v | v | | | | v | | | | | |

| № | Name | Description | Credits | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tools and information system development tools. | | | | | | | | | | |
| 9 | Management of IT projects and information risks | The purpose of mastering the discipline is to form knowledge, skills and abilities in the field of risk management of IT projects, theoretical and practical mastery of modern risk analysis and assessment tools, study the requirements for the development of documentation on risk identification and assessment, familiarization with the principles and methods of risk management to improve business processes and IT infrastructure of the enterprise. | 4 | | | v | | v | | v | | |
| 10 | IT management | The purpose of the course is to study the concepts, goals and objectives of information management. The issues covered in the course are: enterprise architecture and its management; concepts, methodologies and standards of corporate governance; methodologies and standards of information technology management; trends and prospects of information management development. As a result of mastering the discipline, undergraduates will be able to apply management methodology in IT projects. | 5 | v | | | v | | v | | | |
| **The cycle of profile disciplines** **Component of choice** | | | | | | | | | | | | |
| 11 | Data analysis and data extraction | This discipline focuses on the study of information retrieval and data mining techniques. It's about how to find relevant information and subsequently extract meaningful patterns from it. While the basic theories and mathematical models of information retrieval and data mining are covered, the discipline is primarily focused on practical algorithms for indexing a text document, relevance rating, using web resources, text analytics, and evaluating their performance. Practical search and intelligent applications such as web search engines, personalization and recommendation systems, business intelligence, and fraud detection will also be covered. | 5 | | | v | | v | v | v | | |

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| №  | Discipline | Description | | | | | | | | | | |
|----|------------|-------------|---|---|---|---|---|---|---|---|---|---|
| 12 | Methods and means of building information search systems | The discipline studies the methods and principles of building information retrieval systems (IPS) and their practical application. The presentation of information in IPS, the principles of text analysis and document indexing, typical models (Boolean and vector) and algorithms for information retrieval are considered. Basic information about the classification of documents is provided. The course examines modern vocabulary, classification, and meta-search IPS, their practical application, and performance criteria. | 5 | | | v | | v | v | v | | 5 |
| 13 | Business process modeling methods | The course is aimed at developing students' skills in modeling and analyzing business processes in order to solve applied problems. The content of the discipline includes questions about the system, process-oriented approach to business management, methodologies and models, tools for modeling and analyzing business processes and managing complex systems. In the course of studying the discipline, undergraduates use modern tools for modeling and analyzing business processes. | 5 | v | | v | v | | | | | |
| 14 | Models and methods of decision-making in IP | The purpose of teaching the discipline is to study models and methods used in decision support systems, as well as in the development of modern computer information systems. The content of the discipline includes mathematical methods of operation research, methods for solving nonlinear problems of unconditional optimization, methods for solving nonlinear problems of conditional optimization, application of methods and methodology of operation management in the development of computer information processing and control systems. | 5 | v | | v | v | | v | v | | |
| 15 | Applied statistics and data analysis | Applied statistics is a methodological discipline that is the center of statistics. When applying the methods of applied statistics to specific fields of knowledge and branches of the national economy, scientific and practical disciplines such as "statistics in industry", "statistics in medicine", "statistics in psychology", etc. are obtained. From this point of view, econometrics is | 5 | v | | | | | v | | | |

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| | | "statistical methods in economics." Mathematical statistics plays the role of a mathematical foundation for applied statistics. | | | | | | | | | | |
| 16 | Theory and practice of data analysis and interpretation | The purpose of the course is to explore the possibilities of algorithmic support for systems designed for data analysis and interpretation. The discipline considers methods of data analysis and further interpretation of the results obtained. Considerable attention is paid to the issues of data classification using deterministic and statistical models. Methods of reducing data dimensions are considered. New methods of data analysis based on Data Mining technology are being studied. Modern application software packages for solving experimental data processing problems are analyzed. | 5 | | | | | | v | v | v | |
| 17 | Big Data and data analysis | The purpose of the course is to develop students' professional competence in the development and use of systems for processing and analyzing large amounts of data. The content of the discipline examines the methods of analyzing and storing large amounts of data, the stages of the life cycle of big data processing, the languages most suitable for processing and analyzing big data, and ways to organize storage and access to big data. | 5 | | v | | | | v | v | v | |
| 18 | Business Intelligence (Coursera) | The course aims to provide undergraduates with a set of theoretical knowledge and practical skills in applying modern business intelligence information tools to business management. During the practical training, undergraduates master the skills of working in the most popular business intelligence platforms.: Power BI, Qlik Sense, Tableau for decision support in marketing and business management; OLAP (online analytical processing) skills in solving analytical tasks: exploratory analysis, data research, analytical reporting. | 5 | | | | v | v | | | | |
| 19 | Cloud computing | The course will allow you to gain the competencies necessary to work with cloud systems with different settings. The course content addresses the following issues: data collection, visualization, storage, security and automation; designing and deploying a cloud storage system; developing the most convenient and effective strategy for migrating legacy systems to the | 5 | | | v | | | | | v | |

| № | Name | Description | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | cloud; developing testing methods to evaluate the effectiveness of corporate cloud systems in order to make recommendations for their improvement. | | | | | | | | | | | | |
| 20 | Data mining | Data minig is an interdisciplinary discipline that studies the analysis and processing of data of various structures and volumes. Data mining methods are important in the research and development of information systems that solve problems of data analysis, forecasting various indicators in various fields of human activity. In this discipline, students learn both visual and analytical methods to determine the structure of data. The methods of descriptive, cluster, variance, regression data analysis and other parametric and nonparametric methods are studied. During the research, the students use both software packages and special programming languages. | 5 | | | | | | | | v | v | v | v |
| 21 | Machine Learning & Deep Learning | The course focuses on deep learning models. As an area within machine learning, deep learning models illustrate the quantitative-qualitative transition. New models and their properties require separate study and practice of adjusting the meta-parameters of such models. This course covers the basics of deep learning, neural networks, convolutional networks, RN, LSTM, Adam, Dropout, BatchNorm, and Xavier/Hernandez initialization. | 5 | | | | | | | | v | v | v | |
| 22 | OLAP and data warehouses | The purpose of mastering the discipline is to gain in-depth knowledge about data storage systems and data mining and processing technologies. The content of the discipline includes questions on types of data models, concepts and architecture of data warehouses, implementation of procedures and examples of modern corporate systems using OLAP technology. Upon completion of the course, undergraduates will be able to design data warehouses and apply data processing technologies to solve research problems. | 5 | | | v | | | | | | | v | |

## 5. Учебный план образовательной программы

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