CATALOG OF ELECTIVE DISCIPLINES

7M06 - Information and Communication Technologies
(Code and classification of the field of education)

7M061 - Information and communication technologies
(Code and classification of the direction of training)

0610
(Code in the International Standard Classification of Education)

M094 - Information technology
(Code and classification of the educational program group)

7M06101 - Informatics
(Code and name of the educational program)

Master
(Level of preparation)

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The head of AC Nurymkhan G.N.
EP Manager Karymsakova I.B.

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Chairman of the Academic Council Oralkhanova I.A.

Web programming in PHP

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
This discipline includes methods of designing Web sites, the use of graphics on Web pages, methods of processing and editing digital images, maintenance and placement of Web pages, software systems, server technologies, PHP, CSS, JavaScript, installing Apache Web server, working with it, creating MySQL databases, Web-websites, teaches the use of sound technologies and the preparation of technical tasks when creating Web sites, server administration, the use of Web site designers, the principles of working with them.

Purpose of studying of the discipline
Acquisition by students of knowledge about Web programming, mastering the capabilities of the PHP language for programming Web sites and Web interfaces to databases

Learning Outcomes
ON6 Master web programming methods, develop web applications.

Learning outcomes by discipline
1. Briefly describes the technology of designing the structure of a web site as an information system;
2. To present the principles and methods of developing scripts and databases using JavaScript, PHP, MySQL;
3. Demonstrate skills of working with specialized software.
expected learning outcomes:
* Demonstrate knowledge of issues related to exchange protocols*
information from Web servers and client browsers, with ways
effective implementation of Web-interfaces to databases.
* Apply basic design methods and tools*
website software.
* Use the principles of web programming.*
formed competencies:
* Demonstrates the ability to apply modern technologies*
programming to create dynamic websites

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis II

Educational WEB-portals

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The concept of web-technologies. The role of web-technologies in modern education. Functions, classification and current state of web browsers. Interaction between a web server and a browser. Toolkit for developing web-pages. Modern standards of the HTML language. Using CSS Cascading Style Sheets to design web pages, the principle of separation of form and content. Layout of web pages. Fundamentals of server and client scripting languages. Content management systems CMS.

Purpose of studying of the discipline
Mastering knowledge about the principles of functioning and basic technologies used in the creation and use of global information resources, as well as the skills of their effective use in the learning process and in further professional activities.

Learning Outcomes
ON6 Master web programming methods, develop web applications.

Learning outcomes by discipline
1. "Demonstrates knowledge of the main types of modern web-technologies and the principles of their functioning.

2. Uses modern HTML language standards and CSS Cascading Style Sheets to design web page layouts that meet modern requirements.

3. Demonstrates skills in designing templates for content management systems."
be able to evaluate educational portals in terms of the completeness of the implementation of the possibilities of use in educational activities

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis III

Tizen web application development

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is dedicated to learning the basics of programming in Java and gaining knowledge about the modern object-oriented Java

programming language, mastering the basic programming techniques. Students study basic syntax, type system, compilation and launch of Java programs and language capabilities to gain skills in creating simple applications, developing console or window applications. Course topics include paradigm, OOP concepts, Java programming, file processing, exceptions, structures.

Purpose of studying of the discipline

The purpose of the course is to teach undergraduates to create mobile web applications running under the Tizen operating system.

Learning Outcomes

ON6 Master web programming methods, develop web applications.

Learning outcomes by discipline

1. Recognize the Tizen operating system based on the Linux kernel and the GNU C library implementing the Linux API;
2. Develop the interface of mobile applications;
3. Approve the development of web applications implementing HTML5 capabilities, native applications written in C, and hybrid applications using both approaches

Prerequisites

Software Development Technologies

Postrequisites

The research work of a student, including an internship and the implementation of a masters thesis II

Artificial intelligence and decision theory

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

In the process of studying this discipline, master`s student study the concept of artificial intelligence, types of artificial intelligence. The course topics include Architecture and Design of artificial intelligence, Methods and Algorithms of artificial intelligence, Classification of AI Methods. Students will master the application of the theory of artificial intelligence in making managerial decisions, Intelligent decision support systems, Decision Theory. Decision-making modeling.

Purpose of studying of the discipline

The purpose of studying the discipline is to master the concepts of artificial intelligence, types of artificial intelligence, architecture and design of artificial intelligence, methods and algorithms of artificial intelligence, classification of AI methods.

Learning Outcomes

ON4 Demonstrate proficiency in data mining and artificial intelligence methods, be able to apply these methods to solve practical problems.

Learning outcomes by discipline

1. Apply the theory of artificial intelligence when making managerial decisions.
2. Develop intelligent decision support systems.
3. Develop decision making models
Be able to apply the theory of artificial intelligence in making managerial decisions

Prerequisites

Bachelor

Postrequisites

Neural network technologies

Mobile learning and virtual reality

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

In the course of studying the discipline, students study modern developments and trends in the field of creating virtual and augmented reality applications, the capabilities of modern and promising virtual and augmented reality application development tools, the content of the stages of the virtual and augmented reality application development process, virtual and augmented reality application programming technologies, layers of software components that ensure the operation of virtual and augmented reality information systems reality, hardware and software components of user interfaces for visualization and management of virtual objects in immersive environments.

Purpose of studying of the discipline

establish a system of education master`s competences in the field of advanced learning technology solutions for professional activity pedagogical problems.

Learning Outcomes

ON5 Describe the basic concepts of algorithmization and programming, demonstrate skills in developing effective algorithms in the interests of applied fields, demonstrate practical skills and abilities to create algorithms for solving problems and their programs.

Learning outcomes by discipline

1.Describe the hardware and software components of user interfaces for visualization and management of virtual objects in immersive environments;
2. Develop virtual and augmented reality applications;
3 Apply methods and means of obtaining, storing, processing and broadcasting information through modern computer technologies.
Possesses in-depth scientific knowledge in the field of software

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Research work of the undergraduate, including the implementation of the masters thesis I

Models of knowledge in information systems

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies everything related to data and knowledge. Examines issues such as knowledge features, knowledge representation models, the creation of formal and informal models, network, logical, production and frame models. Functional networks. Methods of working with knowledge. Methods of acquiring knowledge. Methods of knowledge representation and processing. Methods of solving problems in knowledge-based systems. The structure of expert systems. Stages of development of expert systems.

Purpose of studying of the discipline
To form a system of competencies of the Master of Education in the field of information systems.

Learning Outcomes
ON5 Describe the basic concepts of algorithmization and programming, demonstrate skills in developing effective algorithms in the interests of applied fields, demonstrate practical skills and abilities to create algorithms for solving problems and their programs.

Learning outcomes by discipline
1. "Describes the methods of representation and processing of knowledge, the stages of building expert systems.

2. Uses problem solving methods in knowledge-based systems.

3. Performs the task of building an expert system."
use scaling and interpretation methods when processing test results

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis III

Applied methods of analysis and processing of information in research

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies applied research methods - to ensure the focus of the process of studying the students of scientific methodology in the interest of determining the design, technology of the organization of research in the field of professional activity, Assessment and selection of methods of information acquisition and data processing and analysis, in particular, knowledge detection and the search for patterns in data. Acquisition of skills of data researcher and developer of mathematical models, methods and algorithms of data analysis

Purpose of studying of the discipline
The purpose of studying the discipline is to form a scientific understanding of applied statistical methods for the study of social phenomena

Learning Outcomes
ON2 To solve problems arising in the course of research activities and requiring in-depth professional knowledge.

Learning outcomes by discipline
1)Know the basic models and methods of machine learning and data development
2) Be able to adequately apply these models and methods, as well as the software in which they are implemented
3) Have the skills to analyze real data using the studied methods

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis II

Automation of scientific research

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies the increase of efficiency and quality of scientific research on the basis of obtaining or clarifying with the help of automated systems of scientific research of mathematical models of objects under study. The automated research system is a software and hardware complex based on computer hardware, designed to conduct scientific research or complex tests of samples of new equipment on the basis of obtaining and using models of objects, phenomena and processes under investigation.

Purpose of studying of the discipline
The purpose of studying the discipline "Means of automation of research work" is to master the methods of planning and conducting research, to study the methods and means of automating their conduct and processing the results obtained, as well as the design of the results of scientific work.

Learning Outcomes
ON2 To solve problems arising in the course of research activities and requiring in-depth professional knowledge.

Learning outcomes by discipline

1) know the methods and means of designing and developing intelligent automation tools for scientific research
2) know the theoretical foundations of innovation and scientific research;
3) be able to apply mathematical, economic and managerial tools to solving professional scientific and technical problems.
Upon completion of the study of the discipline "Means of automation of research work" students should achieve the following learning outcomes:
- to know the basic hardware and software for automation of research work;
- to be able to choose and apply means of automation of research work.
As a result of studying the discipline "Research work automation tools", students should develop competencies related to the formation of knowledge and skills in the selection and application of research work automation tools.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

The research work of a student, including an internship and the implementation of a masters thesis II

Means media, scientific visualization and virtual realities

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

Formation of students` competences in accordance with the requirements of the GOS postgraduate education. Acquisition of knowledge by graduates taking into account professional standards, life cycle of project activity, rules of development of software products of the basics of personnel management, production, psychology of management, information security issues. Training of specialists who implement large-scale changes in the professional sphere and management of scientific processes. The course is studied within the framework of mediavizualism, a new direction of media research.

Purpose of studying of the discipline

The purpose of studying the discipline is to form an idea of various means of scientific research.

Learning Outcomes

ON2 To solve problems arising in the course of research activities and requiring in-depth professional knowledge.

Learning outcomes by discipline

1) know the basics of visualization in the media, the foundations of visual culture, the key provisions of media visualistics
2) analyze visual media texts, prove the advantages of certain visual solutions, create visual media products in an individual style
3) possess basic skills of creating an effective visual media text/project/product based on productive compositional and technological solutions
owns the features of data processing in scientific research

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

The research work of a student, including an internship and the implementation of a masters thesis II

Fundamentals of Blockchain Technologies

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the basic concepts, models and mechanisms of blockchain technology, the fundamental concepts in the cryptocurrency economy. The concept of mining and analysis of blockchain technology and cryptocurrency mining. Bitcoin transactions and their verification. The latest cryptographic technologies used in blockchain technology. Ways to protect user accounts and ensure transaction security, as well as transaction accounting.

Purpose of studying of the discipline

The purpose of mastering the discipline "Fundamentals of Blockchain Technologies" is to gain knowledge from undergraduates about Blockchain technology, methods, means of using this technology, features of the technology, the scope of application of this technology. Prospects for the development of Blockchain technology in the future

Learning Outcomes

ON8 Have the skills to create databases and knowledge using modern software tools. Be able to create database objects in modern database management systems and manage access to these objects, acquire knowledge in the field of database management systems, the ability to include MySQL as a database server in multi-level applications. You will confidently master the tools and algorithms of working in the configurator and be able to put into practice the methods of creating and managing databases.

Learning outcomes by discipline

1. "Has the skills to formulate goals and objectives for monitoring information and communication systems based on blockchain technology.

2. Demonstrates knowledge in the field of the technical foundations of cryptocurrencies, the decentralized Bitcoin network, peer-to-peer architecture, security principles and practical application of cryptocurrencies.

3. Has the skills to develop blockchain applications."
A student who has mastered the discipline knows the conceptual foundations of blockchain technology, understands the advantages and limitations of blockchain technology, and gains the ability to put into practice the knowledge gained during the study of the course, in substantiation, design,
application of blockchain technology in practical work.

Prerequisites
Programming interfaces for computer systems
Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis III

Technologies of distributed databases

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies the basic concepts of design and architecture of distributed databases, basic algorithms and distributed processing. Examines parallel, homogeneous, heterogeneous distributed systems, as well as the advantages and disadvantages of distributed databases. Studies the architecture of Microsoft SQL Server, database application design, automation of administrative tasks, query optimization and implementation of tasks requiring data access.
Purpose of studying of the discipline
The purpose of studying the discipline is to gain knowledge from undergraduates about distributed database technologies, methods, means of using these technologies, features of technologies, areas of application of these technologies. Prospects for the application of distributed database technology.
Learning Outcomes
ON8 Have the skills to create databases and knowledge using modern software tools. Be able to create database objects in modern database management systems and manage access to these objects, acquire knowledge in the field of database management systems, the ability to include MySQL as a database server in multi-level applications. You will confidently master the tools and algorithms of working in the configurator and be able to put into practice the methods of creating and managing databases.
Learning outcomes by discipline
1. "Has the skills to create databases using modern software tools.

2. Develops database objects in modern database management systems and manages access to these objects.

3. Has knowledge in the field of database management systems, the ability to include MySQL as a database server in multi-level applications."
The master student who has mastered the discipline knows the network technologies for using the database; architecture of distributed database systems; network data layouts; management of distributed transactions; studying the principles of organizing distributed applications and gaining competence
Prerequisites
Programming interfaces for computer systems
Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis III

Technologies of structuring information resources

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying the basic concepts in the field of structuring and processing information, data mining. Studies such issues as the representation of various types of information in digitized form, as well as methods and algorithms for information compression. Examines the basic concepts, solved Data Mining tasks and data processing algorithms. Studies the integration of information resources and information retrieval technology.
Purpose of studying of the discipline
The purpose of mastering the discipline "Technologies of structuring information resources" is to gain knowledge from undergraduates about the technologies of structuring information resources, methods, means of using these technologies, features of technologies, areas of application of these technologies
Learning Outcomes
ON8 Have the skills to create databases and knowledge using modern software tools. Be able to create database objects in modern database management systems and manage access to these objects, acquire knowledge in the field of database management systems, the ability to include MySQL as a database server in multi-level applications. You will confidently master the tools and algorithms of working in the configurator and be able to put into practice the methods of creating and managing databases.
Learning outcomes by discipline
1. "Applies in practice the main types and procedures of information processing to solve information processing problems.

2. Demonstrates mathematical and informational formulation of information processing tasks.

3. Develops algorithms for structuring and processing data."
as a result of mastering the discipline, the teacher knows
– principles for the formation of the information society and a new
strategic type of resources - informational;
– structure and principles of classification of information resources, methods and means of access to them;
– segments of the information resources market, offered information products and services;
– organization of the global computer network Internet and its services. And acquires the competence of mastering modern application software designed for navigating the Internet and exchanging information over networks

Prerequisites
Programming interfaces for computer systems
Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis III

Corporate information systems in education

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
This discipline includes the basic concepts and principles of building corporate information systems, general requirements, MES systems, ERP and ERP-II systems, MRP and MRP-II systems, business models, corporate governance and its resources, basic principles of enterprise automation, client-server architectures, existing corporate information systems, i.e. Microsoft Business Teaches the design of Solutions systems-Navision, TB, CRP, FRP, MPS, CRM,SCM and individual components and models of corporate information systems
Purpose of studying of the discipline
The purpose of the discipline is to develop an integrated approach for undergraduates in the formation of knowledge and skills in the field of integrated information systems in solving problems of economics and management, including an understanding of the main business processes of industrial enterprises, the role, tasks and capabilities of information technologies and systems in the modern infrastructure of companies, the features of the introduction and use of integrated information systems.
Learning Outcomes
ON5 Describe the basic concepts of algorithmization and programming, demonstrate skills in developing effective algorithms in the interests of applied fields, demonstrate practical skills and abilities to create algorithms for solving problems and their programs.
Learning outcomes by discipline
1. To present the basic concepts and principles of building corporate information systems (CIS);
2. To investigate the methodology of development and design of individual components and modules of corporate information systems;
3. Make decisions in the implementation, adaptation and configuration of information systems.
use the basic capabilities of Microsoft Dynamics AX, Microsoft Dynamics CRM to solve professional problems in economics and management
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis II

Programming interfaces for computer systems

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
As a result of studying this discipline, students study the relationship between a person and a computer, design and usability analysis of user interfaces, methods of quantitative and qualitative analysis and methods of their application through in-depth analysis of existing and creation of new interfaces, user interface design rules, stages, a set of developer tools, user interface testing and their design, modern tools and programming technologies of hardware software complexes, development of components of network applications.
Purpose of studying of the discipline
The purpose of the course is to teach methods of designing user interfaces, mastering the principles of organization and functioning of software and hardware interfaces in modern computer information systems.
Learning Outcomes
ON5 Describe the basic concepts of algorithmization and programming, demonstrate skills in developing effective algorithms in the interests of applied fields, demonstrate practical skills and abilities to create algorithms for solving problems and their programs.
Learning outcomes by discipline
1. Describe methods and tools for designing software interfaces;
2. Develop algorithms and programs suitable for practical use;
3 Apply existing standard solutions and software design patterns
Own the basic methods, methods and means of obtaining, storing, processing information, have skills in working with a computer as a means of managing information, the ability to work with information in global computer networks, acquire new natural-science, socio-economic, pedagogical knowledge using modern information technologies
Prerequisites
Software Development Technologies
Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis II

System of electronic evaluation of the level of competence

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
In this discipline, the content of education, assessment of the quality of training of specialists, the object of assessment, its criteria,

certification, integrative models of competence assessment, assessment of the level of IT competencies of students, innovative evaluation tools, project method, a number of improvements and examinations of evaluation tools, the method of developing cooperation, methods and criteria for assessing the competencies of students in electronic learning systems are studied

Purpose of studying of the discipline

The study of theories, technologies and practices of didactic systems of electronic assessment of the level of competence.

Learning Outcomes

ON5 Describe the basic concepts of algorithmization and programming, demonstrate skills in developing effective algorithms in the interests of applied fields, demonstrate practical skills and abilities to create algorithms for solving problems and their programs.

Learning outcomes by discipline

1. Briefly outlines competency assessment models and criteria for assessing and the level of formation of It competencies;
2. List the systems of electronic assessment of the level of competence
3. Draw conclusions about the quality of innovative evaluation tools and the level of formation of IT competence
- develop innovative evaluation tools;
work with systems of electronic assessment of the level of competence

Prerequisites

Software Development Technologies

Postrequisites

The research work of a student, including an internship and the implementation of a masters thesis III

Knowledge Engineering

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

Knowledge engineering as a scientific discipline covers specific scientific, technological and methodological problems of creating knowledge-based software systems within the framework of study. Expert systems belong to this class of systems.
The discipline is devoted to the study of the logical model of education, the network model, the production model, the use of fuzzy logic in knowledge-based systems, technology for the development of expert systems and expert systems.

Purpose of studying of the discipline

The purpose of the discipline is to develop a comprehensive approach in the formation of knowledge and skills in the field of application of Integrated Information Systems in solving the problems of Economics and management in undergraduates, which includes understanding the main business processes of industrial enterprises, the role, tasks and capabilities of Information Technologies and systems in the modern infrastructure of companies, the specifics of implementation and use of Integrated Information Systems.

Learning Outcomes

ON5 Describe the basic concepts of algorithmization and programming, demonstrate skills in developing effective algorithms in the interests of applied fields, demonstrate practical skills and abilities to create algorithms for solving problems and their programs.

Learning outcomes by discipline

1. Summarizes the problems of knowledge representation;
2. Apply fuzzy logic in knowledge-based systems;
3. Designing knowledge bases of expert systems
Mastering deep scientific knowledge in the field of software
Understanding the essence and importance of information in the development of modern society
Master the main methods, methods and means of obtaining, storing, and processing information

Prerequisites

Artificial intelligence and decision theory

Postrequisites

Fundamentals of Blockchain Technologies

Neural network technologies

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

In the process of studying this discipline, undergraduates will master the concept of artificial neural network technologies, types of neural networks, tasks of neural networks, the principle of neural networks. The course topics include models and methods of neural network technologies, mathematical models of a neuron, artificial neuron circuits, multilayer neural networks. Undergraduates will master neural network training, the risks of neural network training, the scope of neural networks, the use of neural networks in creating optimal software development methodologies.

Purpose of studying of the discipline

The purpose of studying the discipline is to master the concept of artificial neural network technologies, types of neural networks, tasks of neural networks, principles of neural networks.

Learning Outcomes

ON4 Demonstrate proficiency in data mining and artificial intelligence methods, be able to apply these methods to solve practical problems.

Learning outcomes by discipline

1. Neural network training
2. The use of neural networks in the creation of optimal software development methodologies
The use of neural networks in the creation of optimal software development methodologies

Prerequisites
Bachelor
Postrequisites
Data mining

Basic multimedia technology

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies primary information processing systems, the composition and structure of multimedia technologies, studies the basics of Internet technologies and ways to create multimedia electronic educational resources using specialized programs and web programming languages. Studies the use of multimedia resources in the educational process and ways to create multimedia interactive applications using the multi-paradigm programming language Java Script.
Purpose of studying of the discipline
Development of pedagogical software tools, use of multimedia cabinet in teaching school subjects
Learning Outcomes
ON5 Describe the basic concepts of algorithmization and programming, demonstrate skills in developing effective algorithms in the interests of applied fields, demonstrate practical skills and abilities to create algorithms for solving problems and their programs.
Learning outcomes by discipline
1. "Selects the necessary multimedia devices and technologies for solving a specific educational problem.

2. Demonstrates the ability to create your own multimedia learning tools based on modern technologies.

3. Owns methods and techniques for creating multimedia training tools for the educational process."
develop your own programs using standard algorithm fragments
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Methods of programming multimedia systems

Methods of programming multimedia systems

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at obtaining theoretical knowledge and practical skills in the field of software and hardware organization of multimedia systems. Structure and organization of deployed multimedia applications, their application areas. Principles of construction of dynamic objects, their application: creation of educational multimedia manuals, manuals, training and information systems, virtual reality systems. The requirements for software and hardware for programming multimedia systems are also being studied.
Purpose of studying of the discipline
Obtaining theoretical knowledge and practical skills in the field of software and hardware organization of multimedia systems.
Learning Outcomes
ON7 Master the methods of programming multimedia systems, be able to apply these methods in practice.
Learning outcomes by discipline
"Demonstrates knowledge of the concept of multimedia systems, their classification and applications.

Uses methods of programming multimedia systems.

Develops multimedia applications."
be able to visualize data using general and special-purpose computer graphics software
Prerequisites
Software Development Technologies
Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis III

Object-oriented programming

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
In the course of studying the discipline, students study object-oriented design and programming, abstraction, encapsulation, inheritance and polymorphism, methods and variables, type conversion, instanceof operator, overloading and overriding methods, constructors, access control, exception handling, use of standard templates, external libraries and frameworks, standard Java frameworks and owns the capabilities of libraries, the methodology of joint software development, implementation of a joint project.
Purpose of studying of the discipline

give a general idea of modern programming languages;
show different ways of writing operators that ensure the implementation of any algorithm (following, fork, repetition);
- to study the composition and structure of the Java programming language tools and its use in various fields of professional activity;
- learn the techniques and methods of creating forms using the Java programming language.

Learning Outcomes
ON7 Master the methods of programming multimedia systems, be able to apply these methods in practice.

Learning outcomes by discipline
1. Describe various paradigms of software product development in a historical context; methodology of object-oriented programming;
2. Develop computer models of real and conceptual systems based on the component-oriented programming paradigm;
3 Apply the principles of object-oriented programming.
Has in-depth scientific knowledge in the field of software.

Prerequisites
Bachelor

Postrequisites
Research work of the undergraduate, including the implementation of the masters thesis I

Technology training Programming

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline includes the study of the theoretical and practical part of software development technologies, principles of construction and design of software systems. Study and development of software tools and projects using multimedia tools for teaching based on an object-oriented programming language. Various methods of software layout and creation of services for both teaching and business are considered.

Purpose of studying of the discipline
Familiarization of students with fundamental algorithms of data processing, as well as with modern methods of algorithm research and evaluation of their algorithmic complexity

Learning Outcomes
ON7 Master the methods of programming multimedia systems, be able to apply these methods in practice.

Learning outcomes by discipline
1. "Uses methods of writing algorithms and constructing programs using various algorithmic languages.

2. Applies the principles and methods of structural and object-oriented programming.

3. He is proficient in the methods of software development technology using multimedia tools."
develop your own programs using standard algorithm fragments

Prerequisites
Software Development Technologies

Postrequisites
Research work of the undergraduate, including the implementation of the masters thesis I

The use of cloud computing

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies the history of the development of "cloud computing", deployment architecture, cloud services and Azure Pack, the possibilities of using virtual technologies and platforms, analysis of existing cloud services and ways to connect to them. Examines the economics of cloud computing, the advantages and disadvantages of using cloud services, the migration of "oblak" and the main directions of development. Examines the issues of scaling, deployment, security of use and privacy.

Purpose of studying of the discipline
To provide undergraduates with the opportunity to gain knowledge and practical experience in the field of current cloud computing technologies.

Learning Outcomes
ON9 Get theoretical knowledge and practical skills on the architecture of "cloud" technologies, methods and features of designing "cloud" services, developing applications for the main existing "cloud" platforms.

Learning outcomes by discipline
1. "Owns the methodology of system administration for the development and maintenance of applications deployed in the clouds.

2. Has knowledge of security, scaling, deployment, backup in the context of cloud infrastructure.

3. Demonstrates the skills of deploying and maintaining a private cloud."
to be able to project the infrastructure of the enterprise, for the organization of opportunities to use "cloud" in daily activities

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis III

Cloud computing

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at obtaining general information and characteristics about cloud computing, architecture and the main models of cloud technologies, methods and tools for designing "cloud" services. Examines the existing cloud technology platforms, the advantages and risks associated with the use of "cloud computing", as well as the prerequisites for the transition to "cloud" infrastructure for the use of "cloud" services. Studies application development technologies for the main existing "cloud" platforms.

Purpose of studying of the discipline
The purpose of mastering the discipline "Cloud Computing" is to obtain general information about cloud computing as one of the main trends in information technology, the prerequisites for its development, the main models of cloud technologies necessary for a graduate who has mastered a master`s degree program to solve various tasks of practical, research and teaching activities

Learning Outcomes
ON9 Get theoretical knowledge and practical skills on the architecture of "cloud" technologies, methods and features of designing "cloud" services, developing applications for the main existing "cloud" platforms.

Learning outcomes by discipline
1. "He has theoretical knowledge and practical skills in the architecture of ""cloud"" computing, methods and features of designing ""cloud"" services.

2. Has practical application development skills for the main existing ""cloud"" platforms.

3. Assesses the company`s possible risks of using cloud technologies"
1. "Has theoretical knowledge and practical skills in the architecture of "cloud" calculations, methods and features of designing "cloud" services.

2. Has practical skills in developing applications for the main existing "cloud" platforms.

3. Assesses the possible risks of the company using cloud technologies

Prerequisites
Software Development Technologies

Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis III

Cloudy technologies

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies issues in the field of server and cloud technologies, basic models of cloud computing and cloud solutions, virtualization technology, Windows Azure Queue architecture and Azure Blob Services. Having mastered this discipline, the student will know the Amazon, VMware Cloud, Azure Services Platform platforms and the practical development of Microsoft Word Web App and Microsoft Excel Web App cloud services.

Purpose of studying of the discipline
Formation of undergraduates` knowledge in the field of cloud technologies

Learning Outcomes
ON9 Get theoretical knowledge and practical skills on the architecture of "cloud" technologies, methods and features of designing "cloud" services, developing applications for the main existing "cloud" platforms.

Learning outcomes by discipline
1."Demonstrates knowledge in the field of server and cloud technologies, trends in the development of cloud technologies and solutions.

2. He knows the methods of developing a company`s exit strategy for the use of cloud technologies.

3. Assesses the possible risks of using cloud technologies, selects the optimal strategy for the transition to cloud technologies"
be able to design the infrastructure of the enterprise, to organize the possibility of using the "cloud" in daily activities

Prerequisites
Software Development Technologies

Postrequisites
The research work of a student, including an internship and the implementation of a masters thesis III

Administration and designing of database in MS SQL Server

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline examines the main aspects of managing a multi-user database of data management: database redesign procedures,

parallel processing management, data backup and recovery, replication and navigation, automation of administrative functions in MS SQL Server, user and role management, basic database security measures, features of MS SQL Server, PostgreSQL and MongoDB DBMS management

Purpose of studying of the discipline

-To master the technology of various work with databases.
- Familiarity with the basics of the .SQL language.
-Familiarity with the basic operations of databases.

Learning Outcomes

ON8 Have the skills to create databases and knowledge using modern software tools. Be able to create database objects in modern database management systems and manage access to these objects, acquire knowledge in the field of database management systems, the ability to include MySQL as a database server in multi-level applications. You will confidently master the tools and algorithms of working in the configurator and be able to put into practice the methods of creating and managing databases.

Learning outcomes by discipline

1. Have the skills to administer database applications;
2. To develop information models of objects of professional activity in various subject areas
3. Modernizes the software and hardware of information and automated systems when designing databases
develop the structure of a multi-user database, create user applications using interactive DBMS tools; create complex queries and programs (scripts) to implement multi-operator queries and process relational databases

Prerequisites

Programming interfaces for computer systems

Postrequisites

The research work of a student, including an internship and the implementation of a masters thesis III

Administration of the multiuser data bases

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline examines the main aspects of managing a multi-user database of data management: database redesign procedures, parallel processing management, data backup and recovery, replication and navigation, automation of administrative functions in MS SQL Server, user and role management, basic database security measures, features of MS SQL Server, PostgreSQL and MongoDB DBMS management.

Purpose of studying of the discipline

To consider the theoretical foundations of databases, to form skills and abilities for the effective solution of tasks of administration and data management in multi-user databases

Learning Outcomes

ON8 Have the skills to create databases and knowledge using modern software tools. Be able to create database objects in modern database management systems and manage access to these objects, acquire knowledge in the field of database management systems, the ability to include MySQL as a database server in multi-level applications. You will confidently master the tools and algorithms of working in the configurator and be able to put into practice the methods of creating and managing databases.

Learning outcomes by discipline

1. Have the skills to administer database applications;
2. To develop information models of objects of professional activity in various subject areas
3. Modernizes the software and hardware of information and automated systems when designing databases
develop the structure of a multi-user database, create user applications using interactive DBMS tools; create complex queries and programs (scripts) to implement multi-operator queries and process relational databases

Prerequisites

Programming interfaces for computer systems

Postrequisites

The research work of a student, including an internship and the implementation of a masters thesis III

Robotics

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

In the process of studying this discipline, undergraduates will master the concept of a manipulator, a robot, technical characteristics of robots, structural and kinematic classification of manipulators of robotic systems. The course topics include coordinate transformations in robotic systems, determining the position of coordinates of points, a direct kinematics problem. Undergraduates will learn how to solve the direct kinematics problem and determine the speeds of the manipulator drive points, the inverse kinematics problem.

Purpose of studying of the discipline

The purpose of studying the discipline is to master the concepts of a manipulator, a robot, technical characteristics of robots, structural and kinematic classifications of manipulators of robotic systems.

Learning Outcomes

ON10 Demonstrate knowledge in the field of robotics, develop programs for robotic complexes.

Learning outcomes by discipline

1. Know the transformation of coordinates in robotic systems
2. Be able to determine the position of the coordinates of points

3. Be able to solve the direct problem of kinematics
Be able to solve the direct problem of kinematics and determine the speeds of the points of the manipulator drives, the inverse problem of kinematics

Prerequisites
Neural network technologies

Postrequisites
Final examination

Data mining

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
In the process of studying this discipline, the main methods and tools of DM are considered. Course topics include: The evolution of ICT and the potential of data mining, DM in business, and HELL in solving complex applied problems, Main tasks and classification of data analysis methods, Basic methods of data analysis and interpretation, High-performance data processing. Undergraduates will learn how to work with DATA MINING tools.

Purpose of studying of the discipline
The purpose of studying the discipline is the development of IAD in solving complex applied problems, the main tasks and classification of data analysis methods, the main methods of data analysis and interpretation, high-performance data processing.

Learning Outcomes
ON4 Demonstrate proficiency in data mining and artificial intelligence methods, be able to apply these methods to solve practical problems.

Learning outcomes by discipline
1. Apply IAD in solving complex applied problems
2. Work with DATA MINING tools.
Undergraduates will learn how to work with DATA MINING tools.

Prerequisites
Neural network technologies

Postrequisites
Final examination

Estimation of the complexity of algorithms

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying the concept of algorithm complexity, measuring and evaluating algorithm complexity, effective algorithms for solving problems and evaluating basic algorithms for sorting and searching information. Consideration of the types of functions of complex algorithms and the mathematical apparatus of algorithm analysis. The study of the calculation of the number of operations performed, the asymptotic notation used in the analysis of the growth rate and the comparison of the complexity of algorithms.

Purpose of studying of the discipline
the study of the dependence of the number of elementary operations performed by a computer on the amount of information processed.

Learning Outcomes
ON2 To solve problems arising in the course of research activities and requiring in-depth professional knowledge.

Learning outcomes by discipline
"Develops algorithms for specific tasks.

Estimates the complexity of ready-made algorithms and tasks.

Constructs own efficient algorithms in the interests of application areas."
"Develops algorithms for specific tasks.

Estimates the complexity of ready-made algorithms and tasks.

Constructs own efficient algorithms in the interests of application areas.."

Prerequisites
Bachelor

Postrequisites
Research work of the undergraduate, including the implementation of the masters thesis I

Numerical Methods

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at studying the basic concepts and definitions of computational mathematics and methods of their solution. Such issues as solving nonlinear equations, approximation of functions, number error, numerical differentiation and integration, numerical methods for solving linear algebra and ordinary differential equations, Cauchy problems, boundary value problems using specialized and integrated Matlab and Mathcad packages are considered.

Purpose of studying of the discipline

Using modern computer technology with the approximate and numerical analysis

Learning Outcomes

ON5 Describe the basic concepts of algorithmization and programming, demonstrate skills in developing effective algorithms in the interests of applied fields, demonstrate practical skills and abilities to create algorithms for solving problems and their programs.

Learning outcomes by discipline

"He applies in practice the theory of errors, the theory of approximation of functions, the theory of numerical differentiation and numerical integration, as well as methods for solving linear and nonlinear equations, numerical methods for solving ordinary differential equations and partial differential equations.

Demonstrates the ability to apply computer technologies for numerical solution of practical problems in practice.

Has the skills to solve practical problems using the integrated Matlab and Mathcad packages using numerical methods"
as a result of mastering the discipline, the student Describes the basic concepts of algorithmization and programming, demonstrates the skills of developing effective algorithms in the interests of applied fields, demonstrates practical skills and abilities to create algorithms for solving problems and their programs and receives competence - has in-depth scientific knowledge in the field of software

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Programming interfaces for computer systems