

TURAN-ASTANA University

APPROVED

**at the meeting of the Academic Council
of Turan-Astana University**

Protocol № 77 " 22 22 " 02 2023 d

Chairman of the Academic Council

_____ Professor G. A. Dzhaparova

CATALOG OF ELECTIVE SUBJECTS

6B06101 - "INFORMATION SYSTEMS"

DURATION OF TRAINING – 4 YEARS

(ADMISSION – 2023 YEARS)

ASTANA, 2023

**Catalog of elective subjects
OP 6B06101-Information Systems**

KOD Module code Module	name	Discipline	code Name of disciplines	Summary	Number of credits (KZ/ ECTS)	Semester	Prerequisites	Post-prerequisites	Expected results of studying the discipline
1	2	3	4	5	6	7	8	9	10
Basic disciplines									
Elective component									
M1	Special	TPO2201	Software testing	<p>The purpose of studying the discipline: to teach students testing techniques and technologies that will allow them to ensure the quality of a software product and increase its reliability and efficiency.</p> <p>Within the framework of this discipline, the following subjects are studied: Fundamentals of software testing. Automation of testing. Testing web applications. Testing mobile apps. Security testing.</p>	5/5	4	Fundamentals of algorithms and programming	Advanced programming in Python	<p>1. Knowledge acquired by students: use testing methods and tools; create test cases and correct errors.</p> <p>2. Skills acquired by students: understand the life cycle of software testing; work with databases.</p> <p>3. Skills and competencies acquired by students: analyze and present test results; develop test cases.</p>
M1	Special	TMP2201	Testing of multimedia applications (including computer games)	<p>The aim of the discipline is to teach students how to test computer games and multimedia applications, including testing functionality, performance, security, and user interface.</p> <p>Within the framework of this discipline, the following subjects are studied:</p>	5/5	4	Fundamentals of algorithms and programming	Advanced programming in Python	<p>1. Knowledge acquired by students: test multimedia products; use testing methods and tools;</p> <p>2. Skills acquired by students: analyze test results; work in a team with developers.</p> <p>3. Skills and competencies acquired by students: create a test case; work with test</p>

				Basic concepts of testing multimedia applications. Lifecycle of testing multimedia applications. Testing the functional requirements of multimedia applications.					environments.
M2	Special	ChM2202	Numerical methods	<p>The purpose of studying the discipline: to learn how to apply numerical algorithms to solve mathematical problems, as well as to evaluate the accuracy of the results obtained.</p> <p>Within the framework of this discipline, the following subjects are studied: Methods for solving systems of linear algebraic equations; Approximate methods for solving nonlinear equations; Interpolation by polynomials; Numerical differentiation; Quadrature formulas.</p>	5/5	5	Mathematics, discrete mathematics	Repair of modern computers and laptops	<p>1.The knowledge acquired by students: to navigate the flow of information about numerical methods, to be able to practically apply them to specific applied problems; to assess the errors of the methods used, to implement computational algorithms in a high-level programming language.</p> <p>2. Skills acquired by students: apply numerical methods and bring the solution of various classes of problems to the number</p> <p>3.Students ' acquired skills and competencies: apply numerical methods to solve various applied problems.</p>
M2	Special	KAG2202	Computer algebra and geometry	<p>The purpose of studying the discipline: mastering the skills of using computer tools to solve algebraic and geometric problems, as well as developing abstract thinking and logical thinking.</p> <p>Within the framework of this discipline, we study: Groupoids-sets with one binary operation; Ringoids-sets with two binary operations; Morphisms of mapping algebraic structures.</p>	5/5	5	Mathematics, Discrete Mathematics	Personal Computer repair and Maintenance	<p>1.Knowledge acquired by students: define basic concepts and formulate basic theorems with examples, the basics of programming on the Wolfram mathematics platform.</p> <p>2. Skills acquired by students: solve computational and theoretical problems in the field of group theory and field theory, program in Mathematica.</p> <p>3. Skills and competencies acquired by students: solve problems using the mathematical apparatus of group theory, field theory, and analytical methods of algebraic structures.</p>
M1	Special	PU2203	Programming in	The purpose of studying the	5/5	6	New	Advanced Python	1.Knowledge acquired by

			UML	<p>discipline: learn how to use standard UML graphical notations to describe and design object-oriented software systems, and improve the quality of their analysis, design, and development.</p> <p>This discipline covers: The basics of UML: class diagrams, sequence diagrams, state diagrams, and others. Designing the application architecture using UML. Database Design using UML.</p>			Programming Technologies	Programming	<p>students: programming in the UML language: structural and behavioral diagrams, their elements and purpose; understanding the software development process and the role of UML in this process.</p> <p>2. Skills acquired by students: create class diagrams, sequence diagrams, state diagrams, and activity diagrams in accordance with project requirements.</p> <p>3. Skills and competencies acquired by students: use UML diagrams to document and communicate with other project participants; design systems using UML diagrams; understand the principles of modular programming and create modular systems using UML diagrams.</p>
M3	Special	-	KM2203 Computer modeling	<p>The purpose of studying the discipline: to master the skills of creating mathematical and computer models of real systems and processes for analyzing, predicting and optimizing their behavior and functioning.</p> <p>This discipline focuses on: Mathematical methods used in computer modeling. Programming in the languages used in modeling. Methods and tools for visualizing simulation results.</p>	5/5	6	New programming technologies	Computer graphics and 3D visualization	<p>1. Knowledge acquired by students: choose the most appropriate modeling methods for a specific task; analyze and interpret the results of modeling.</p> <p>2. Skills acquired by students: evaluate the quality of modeling and its accuracy; program and configure computer models;</p> <p>3. Skills and competencies acquired by students: use computer programs to visualize and analyze the results of modeling.</p>
Profile disciplines									
Elective component									
M1	Special	TOOP3101	Object-oriented programming technology	<p>The purpose of studying the discipline: to master the principles, methods and tools of object-oriented programming for the development of high-quality,</p>	5/5	5	Fundamentals of algorithms and programming	Advanced programming in Python	<p>1. Knowledge acquired by students: use structural and object-oriented methods. programming; observe the principles of design</p>

				<p>modular and extensible software applications.</p> <p>Within the framework of this discipline, the following subjects are studied: Object-oriented C++environment. OOP features. The C++language. Simple, enumerated, interval, and structural data types. Classes. A library of visual components.</p>					<p>organization and content of the stages of the software development process.</p> <p>2. Skills acquired by students: to develop and implement algorithms for solving problems using mathematical tools; to apply the principles of procedural and object-oriented approaches in programming problems, to develop application programs.</p> <p>3. Skills and competencies acquired by students: to program in modern environments; to use modern methods of object-oriented programming when coding software systems of different levels of complexity.</p>
M1	Special	PYaVU3101	Programming in high-level	<p>languages The purpose of studying the discipline: it is aimed at acquiring the skills of developing programs using modern programming languages to solve practical problems.</p> <p>This courseincludes: Introduction to Programming in high-level languages. Data types. Operations on data. Syntax of high-level languages. Fundamentals of algorithm development. Object-oriented programming and patterns.</p>	5/5	5	Fundamentals of algorithms and programming	Programming in C#	<p>1.Knowledge acquired by students: use terminology and basic definitions related to the discipline being studied; basic static and dynamic data types; basic tool environments for creating software in high-level languages</p> <p>2.Skills acquired by students: to solve typical tasks of programming automation systems in high-level languages, including using specialized packages and libraries</p> <p>3. Skills and competencies acquired by students: to develop complexes of technical means, algorithms and software for modern automation systems of technological processes using high-level languages for error detection and software optimization</p>
M1	Special	NP3102	No-code platforms	<p>The purpose of studying the discipline: to master tools for</p>	5/5	3	Information and	Technology for creating client-	<p>1.Knowledge acquired by students: demonstrate the</p>

				<p>creating applications and automating business processes without writing code, to speed up and simplify the development process and use your resources more efficiently.</p> <p>Within the framework of this discipline, we study: Database in No Code-Airtable. Chatbots. Mobile apps without programming. Web applications without programming. And tools for graphic design. Spark AR Studio</p>			communication technologies	server applications Basics of WEB design and WEB programming	<p>basics of a database, mobile application, web application, and computer graphics</p> <p>2.Skills acquired by students: design and create applications, quickly develop applications without serious quality losses.</p> <p>3.Skills and competencies acquired by students:developing form without using code</p>
M1	Special	IMOIT3102	Tools and methods for IT optimization	<p>The purpose of studying the discipline: to master the skills of finding and applying effective tools and methods for optimizing the operation of information technology systems to increase their efficiency and economic benefits.</p> <p>This discipline focuses on: Structural analysis and fundamentals of process management. Modeling of an organization's activities and methods for analyzing and optimizing business processes. Applied aspects of Process Mining.</p>	5/5	3	Information and communication technologies	Database theory Application design and development	<p>1.Knowledge acquired by students: to know the main methods and standards for describing, analyzing and optimizing the architecture and business processes of an enterprise; to demonstrate the main methods of managing information systems and services.</p> <p>2. Skills acquired by students: describe, analyze and optimize business processes and enterprise architecture; identify business needs in order to determine ways to meet them based on information and communication technologies.</p> <p>3. Skills and competencies acquired by students: use the skills of describing, analyzing and optimizing the business processes of the enterprise.</p>

M1	Special	RSKN3103	Repair of modern computers and laptops	<p>The purpose of studying the discipline: to gain knowledge and skills in diagnosing and troubleshooting problems in modern computers and laptops to ensure their smooth operation.</p> <p>Within the framework of this discipline, we study: Definition, purpose, main characteristics and classification of a computer. Ways to organize your memory. Ways to increase memory capacity. Random access Memory (RAM).</p>	4/4	3	Information and communication technologies	Modern cloud technologies and virtualization systems	<p>1. Knowledge acquired by students: demonstrate systematic knowledge about the architecture of computer systems, the organization and basic principles of operation of electronic computing devices, in particular storage devices, processors and computer complexes in general.</p> <p>2. Skills acquired by students: use knowledge of the architecture of computer systems, storage devices, processor systems; possess skills in designing functional units and skills in technical implementation and modernization of electronic computing machines and their components.</p> <p>3. Skills and competencies acquired by students: to master the architectural features of modern computers and computer systems; the basics of organizing computer complexes.</p>
M1	Special	POPK3103	Repair and maintenance of personal computers	<p>The purpose of studying the discipline: to master practical skills in computer maintenance, diagnostics and repair.</p> <p>Within the framework of this discipline, the following subjects are studied: Composition, purpose, and technical characteristics of functional base nodes of personal computers. Diagnostics and operation of computers. Troubleshooting and hardware failures of personal computers.</p>	4/4	3	Information and communication technologies	Fundamentals of cloud computing	<p>1. Knowledge acquired by students: knowledge of entering computer equipment and computer office equipment into operation at the workplace of users, diagnostics of work needs and maintenance of computer office equipment.</p> <p>2. Skills acquired by students: choose the hardware configuration of a personal computer, server of peripheral devices, equipment of computer office equipment, configure and maintain the parameters of hardware functioning, eliminate problems and failures in the</p>

								operation of hardware	
								3. Skills and competencies acquired by students: maintain the device of a personal computer and servers; install the BIOS for a personal computer and servers.	
M1	Special	PPP3104	Advanced Python Programming The	<p>goal of studying the discipline is to expand your knowledge and skills in Python programming, master advanced techniques and tools necessary for creating complex high-level software systems.</p> <p>Within the framework of this discipline, students study: Introduction to programming in Python, syntax. Different styles of writing programs. Use of the Python language in various fields. Python for data analysis.</p>	5/5	4	Technology of object-oriented programming	Geoinformation systems	<p>1. Knowledge acquired by students: apply the syntax and structure of the Python language to data processing capabilities of built-in libraries and functions of using the Python language, especially the organization of additional subroutines</p> <p>2. The skills acquired by students are: to create programs using the syntax and structures of the Python language; to apply built-in Python modules and functions for data processing to create their own programs and subroutines using both built-in and independent developed subprograms and modules in the Python language.</p> <p>3. Skills and competencies acquired by students: write program code using Python syntax and language skills in structures, use built-in modules and Python functions for data processing, design, test and debug programs and subroutines using both built-in and independent developed subprograms and modules in Python</p>
M1	Special	PYaC3104	Programming in C#	<p>The purpose of studying the discipline: to master the language and principles of object-oriented programming, to create applications for the platform .NET and develop</p>	5/5	4	Programming in high-level languages	Logistics Information Systems	<p>1. Students ' acquired knowledge: write programs in the C# programming language and apply the principles of class libraries .NET in the development of programs and</p>

				software solutions using modern technologies. This discipline focuses on: Data types in C#. Types passed by value and by reference. C# syntax and differences from C++. Program structure in C#.					the concept of object-oriented programming, programming; 2. Skills acquired by students: to be familiar with C# development tools and technologies for working with files, streams, databases, XML documents, and the user interface 3. Skills and competencies acquired by students: develop applications; create a user interface.
M1	Special	OS3105	Operating systems and environments	The purpose of studying the discipline: mastering the knowledge and skills of working with the main components of operating systems, managing computer resources, improving productivity and ensuring the security of computer systems. Within the framework of this discipline, the following subjects are studied: Purpose and functions of the operating system. Types of operating systems. The main components of the operating system. Files and directories. Processes and threads.	5/5	4	Information and communication technologies	Cryptographic data protection	1. Knowledge acquired by students: to solve problems of functions, composition and principles of operation of operating systems and architecture of modern operating systems; to describe the features of building and functioning of families of Linux and Windows operating systems; to manage resources in the operating system. 2. Skills acquired by students: manage operating system boot parameters; configure hardware devices; manage accounts, configure user working environment parameters; manage disks and file systems, configure network parameters, manage resource sharing in a local network 3. Skills and competencies acquired by students: install and work in Linux operating systems .
M1	Special	OOSL3105	Fundamentals of the Linux operating system	The purpose of studying the discipline: to acquire knowledge and skills in working on the command line, managing the file system, configuring network connections and installing programs for successful work in	5/5	4	Information and communication technologies	Database security and organization,	1. knowledge acquired by students: to know the prerequisites for the emergence of operating systems and the evolution of operating systems; 2. Skills acquired by students: to install and

				<p>the Linux environment.</p> <p>The course focuses on: The history of Unix and Linux operating systems development. Virtual machines. Linux operating systems and their distributions. Shells of the Linux operating system. Processes. Process interaction and synchronization. File system of the Linux operating system</p>					<p>configure Linux operating systems; to set access rights to resources of the Linux operating system</p> <p>3. Skills and competencies acquired by students: programming on at the level of the Linux operating system</p>
M3	Special	PP3DP3106	Production of products on a	<p>3D printer The purpose of studying the discipline: to master knowledge and practical skills in working with 3D printing software and hardware to create prototypes and finished products.</p> <p>Within the framework of this discipline, the following subjects are studied:: Geometric modeling. Basic concepts of three-dimensional computer modeling. Three-dimensional modeling software. Object models. Methods of three-dimensional computer modeling.</p>	5/5	5	Information and communication technologies	Fundamentals of WEB design and WEB programming	<p>1.Knowledge acquired by students: use basic concepts and terms of geometric modeling to the extent necessary for practical use; key concepts of three-dimensional modeling; terms used in three-dimensional modeling; software for three-dimensional modeling; elements of models processed by the software.</p> <p>2. Skills acquired by students: formalize the obtained working results in the form of presentations, scientific-and technical reports, articles and reports at scientific and technical conferences; consistently solve problems of developing an algorithm for creating three-dimensional models</p> <p>3.Skills and competencies acquired by students: create three-dimensionale models using various methods.</p>

M3	Special	S3DS3106	Scanning on a 3D scanner	<p>The purpose of studying the discipline: mastering the skills of creating three-dimensional models, visualizing and animating objects using computer technologies for use in various fields, including architecture, multimedia, the gaming industry and many others.</p> <p>Within the framework of this discipline, we study: Color representation in a computer. Fractals. Rasterization algorithms. Algorithms for processing bitmap images. Image filtering. Vectorization. Two-dimensional transformations. Transformations in space.</p>	5/5	5	Information and communication technologies	Application design and development	<p>1. Knowledge acquired by students: demonstrate methods and tools of computer graphics and geometric modeling; fundamentals of vector and raster graphics; theoretical aspects of fractal graphics; basic methods of computer geometry; algorithmic and mathematical foundations of building realistic scenes; solve problems of implementing computer graphics algorithms using an electronic computer.</p> <p>2. Skills acquired by students: implement basic algorithms for raster and vector graphics programmatically; use graphics standards and libraries.</p> <p>3. Skills and competencies acquired by students: to develop models of information system components, including database models; to develop components of software complexes and databases, to use modern programming tools and technologies; to justify the project decisions made, to set up and perform experiments to verify their correctness and effectiveness.</p>
M1	Special	TSKSP3107	Technology for creating client-server applications	<p>The purpose of studying the discipline: mastering the skills of developing applications that interact over the client-server protocol, using modern technologies and programming tools.</p> <p>This discipline focuses on: Basic concepts and definitions of a database. Data models. Relational calculus of relations. Distributed databases. Creating a database.</p>	5/5	5	No-code platforms	IT tools for creating projects	<p>1. Knowledge acquired by students: demonstrate the theory of designing a database management system; stages of building a database management system; SQL language commands for creating a database and other objects of the database management system, working on data and objects of the database management system, maintaining and administering</p>

				Structured Query language SQL-DDL.					the database. 2. Skills acquired by students: design database management systems and develop application systems for automated data processing using modern database management systems on various hardware platforms in various subject areas. 3. Skills and competencies acquired by students: develop a database management system; create database management systems; implement information technologies in the on-screen interface of modern database management systems; apply methods for designing a database management system for specific subject areas.
M4	Special	TBD3107	Database Theory	<p>The purpose of studying the discipline: to master the theoretical knowledge and skills of database design and management to ensure efficient storage, organization and use of data in information systems.</p> <p>Within the framework of this discipline, the following subjects are studied: Theoretical, methodological and practical constructions of relational database systems based on relational algebra and the ER diagram method, methods of reducing database structures to normal forms.</p>	5/5	5	IT Optimization tools and techniques	Data structure and data management	<p>1. Knowledge acquired by students: show the basic schemes used in the design and use of modern databases, have basic concepts about data management systems, work skills with the Access database management system and MS SQL Server, understand the problems of the subject area, be fluent in the basic concepts and concepts of databases</p> <p>2. Skills acquired by students: create databases using information technologies and use them in practical activities.</p> <p>3. Skills and competencies acquired by students: build simple logical schemes for using relational database management systems; design database schemes using the ER diagram method.</p>
M1	Special	PS1CP3108	Programming in	purpose of studying the	5/5	5	No-code	Production-Pre-	1. Knowledge acquired by

			<p>1C environment:The</p> <p>discipline: to master the skills of creating software solutions in the 1C language and developing application software for automating business processes of an enterprise.</p> <p>Within the framework of this discipline, the following subjects are studied: Introduction to the 1C software system. Programming configuration objects. The properties palette. Basic 1C designs. Internationalization. Reference books. General techniques for working with reference books.</p>			platforms	graduate practice	<p>students: demonstrate the basics of the built-in language, the methodology of programming and configuring the system; the technological platform and components of the 1C: Enterprise system</p> <p>Skills acquired by students: automatically generate transactions with primary documents (invoices, requirements, cash orders, advance reports, etc.). standard operations; perform bank and cash register operations; generate various reports; perform routine operations; receive various analytical information; automate the input of standard operations that allow the user to automate the input of frequently repeated operations.</p> <p>3. Skills and competencies acquired by students: to conduct a comparative analysis of software products and development tools; to develop information system modules in accordance with the terms of reference; to administer databases within their competence; to use information technologies in professional activities</p>
M1	Special	RP1C3108	<p>- RP1C3108 1C application development</p> <p>The purpose of studying the discipline: to acquire skills in creating and configuring information systems on the 1C platform for automating business processes in organizations.</p> <p>Within the framework of this discipline, the following subjects are studied: Theory of accounting for programmers.</p>	5/5	5	IT optimization tools and methods	Production and Pre-graduate practice	<p>1.Knowledge acquired by students: to know the basic concepts and principles of functioning of the 1C system.</p> <p>2. Skills acquired by students: make changes to the composition of standard configurations and develop configurations "from scratch".</p> <p>3. Skills and competencies acquired by students: develop</p>

				Software platform of the 1C: Enterprise system. Configurator. Export-import of XBASE data (DBF file). Performing work on data migration using text files.					specifications for individual components; develop software product code based on ready-made specifications at the module level; optimize the program code of the module.
M1	Special	OISITISP3109	Fundamentals of information systems and IT tools in creating projects	<p>The purpose of studying the discipline: to gain the knowledge necessary for and use of information systems in various fields of activity.</p> <p>The following subjects are studied in this discipline: Information system as the main part of the management system. Problems of systems theory. Life cycle of information systems. Project concept and project management information. Methodology and technology of development is.</p>	6/6	6	Technology of object-oriented programming	Modern cloud technologies and virtualization systems	<p>1. Knowledge acquired by students: to make up the structure of information systems, technical and software tools; to have an idea of the structure of the information process and to know the basics of organizing information processes</p> <p>2. Skills acquired by students: use system analysis in setting and algorithmizing information system tasks, determine the conceptual model of information systems</p> <p>3. Skills and competencies acquired by students: form the tasks of an information system, determine the conceptual model of information systems.</p>
M4	Special	SDUD3109	Data structure and data management	<p>The purpose of studying the discipline: it is to master the principles of organizing, storing and processing data for efficient and convenient access to information, as well as to develop skills in database design and implementation.</p> <p>Within the framework of this discipline, the following subjects are studied: Fundamentals of database theory. Database management systems. Overview of modern database management systems. Database representation levels. Data models. Database languages. Normalization of relations.</p>	6/6	6	IT optimization tools and methods	Database concept	<p>1. Knowledge acquired by students: apply the basics of database theory; use the features of the relational model and their impact on database design, ensure consistency and integrity of data and design tools for database structures.</p> <p>2. The skills acquired by students: to build a model of the subject area software and create databases corresponding to it; to organize data entry into databases and provide data manipulation; to formulate queries to databases.</p> <p>3. Skills and competencies acquired by students: design</p>

								relationality реляционные databases; implement complex data structures (lists, hierarchies, networks) using the relational database management system; design the main stages of the database life cycle, support and maintenance, and know the methodology for data backup.	
M1	Special	GS3110	Geoinformation systems	<p>The purpose of studying the discipline: mastering the knowledge of modern technologies of information systems focused on the analysis of spatial (geographical) data.</p> <p>Within the framework of this discipline, the following subjects are studied: Basic concepts of geo informatics. Areas of application of geographic information systems. Spatial elements A map is a model for representing reality. Cartographic process.</p>	5/5	6	Fundamentals of algorithms and programming	Writing and defending a thesis (project)	<p>1. Knowledge acquired by students: indicate the main provisions of geoinformatics basic principles of the organization and functioning of geo information systems; models of data representation in geo information systems; data input/output technologies in geo information systems; fundamentals of spatial data analysis in geo information systems;</p> <p>2. Skills acquired by students: to mark up geographical information; to perform the stages of work on creating a digital cartographic system. basics; create projects in a standard geographic information system environment and analyze spatial data.</p> <p>3. Skills and competencies acquired by students: demonstrate skills of working in the environment of a standard geo information system; using methods of marking up geographical information.</p>
M1	Special	ISL3110	Logistics Information systems	<p>The purpose of studying the discipline: Mastering knowledge and skills in the design, development and use of</p>	6/6	6	Fundamentals of algorithms and programming	Writing and defending a thesis (project)	<p>1. Knowledge acquired by students: Demonstrate the basics of logistics management and its</p>

				<p>information systems used in logistics, in order to increase the efficiency and optimize logistics processes.</p> <p>Within the framework of this discipline, the following subjects are studied: Fundamentals of logistics and logistics management. Principles and methods of designing information systems in logistics. Information technologies in logistics: enterprise resource planning (ERP) systems, logistics chain management (SCM) systems.</p>					<p>interaction with information technologies. Architecture of information systems in logistics and their components Methods of designing, developing and implementing information systems for logistics tasks.</p> <p>2. Skills acquired by students: Design, develop and implement information systems for solving logistics problems. Analyze and optimize logistics processes using information systems.</p> <p>3. Skills and competencies acquired by students: design the development of information systems for logistics tasks. Skills in analyzing and optimizing logistics processes using information systems; Competence in using various information technologies in logistics; Competence in selecting and configuring software for solving logistics problems.</p>
M1	Special	OWDWP3111	<p>Fundamentals of WEB design and WEB programming</p>	<p>The purpose of studying the discipline: to master the basic skills of web design and programming, to understand the principles of creating websites.</p> <p>Within the framework of this discipline, we study: The history and main trends in the development of Web-technologies. Hypertext markup, the structure of an HTML-document. Cascading CSS style CSS sheets. The JavaScript language. Dynamic HTML and object model of the document.</p>	4/4	6	Information and communication technologies	Mobile platforms and systems	<p>1. Knowledge acquired by students: functioning principles of organization, web technologies based on modern WEB- technologies with the help of ASP.NET.</p> <p>2. The skills acquired by students to be able to create software applications based on modern Internet technologies;</p> <p>3. The skills and competencies acquired by students: to create web pages, as well as to design and use them in practical activities.</p>
M1	Special	PRP3111	<p>Application design and development</p>	<p>The purpose of studying the discipline: to master the skills of software design and development</p>	6/6	6	Information and communication	Creating analytical applications based on a database	<p>1. Knowledge acquired by students: to build the principles of Internet applications; basic</p>

				<p>to create a high-quality software product.</p> <p>Within the framework of this discipline, you will learn: The basics of creating Web Pages. Hypertext links and illustrations on Web Pages. Formatting tables. Frames and forms. Installing and configuring PHP.</p>			technologies		<p>principles of cross-browser layout; principles of data exchange between clients and servers on the Internet;.</p> <p>2. Skills acquired by students: to build a professional strategy for the development and implementation of web applications; to plan the architecture of web applications taking into account current development trends; identify common characteristics of different types of data and process them using the principles of object-oriented design.</p> <p>3.The skills and competencies acquired by students: using algorithms and data structures to solve specific problems; applying object-oriented programming concepts; and creating and developing web applications.</p>
M1	Special	SAS3112	System administration of networks	<p>The purpose of studying the discipline: to teach students how to manage, configure and maintain computer networks.</p> <p>This discipline focuses on: Virtualization systems. Modeling of corporate system components. Installing additional software. Basics of UNIX operating system administration. Configuring a dedicated UNIX server. Network programming.</p>	5/5	7	Repair of modern computers and laptops	Cryptographic data protection	<p>1. Knowledge acquired by students: demonstrate the stages of deploying corporate systems; use virtualization systems in the CIS.</p> <p>2. The skills acquired by students: to create and configure a dedicated UNIX server on a local network; to create virtualization systems and configure them; to develop network applications built on the client-server model.</p> <p>3. Skills and competencies acquired by students: to work with components of modern corporate systems and with virtualization systems used in the CIS.</p>
M1	Special	SSS3112	Modern communication	<p>Purpose of the discipline: acquisition of knowledge about</p>	5/5	7	Repair and maintenance of	Security and database	<p>1. Knowledge acquired by students: demonstrate the</p>

			<p>networks</p> <p>modern technologies and data transmission protocols.</p> <p>Within the framework of this discipline, the following subjects are studied: The subject of artificial intelligence research. Knowledge representation systems. Definitions, classification, and structure. Basics of fuzzy logic. Fuzzy inference systems. Fuzzy controls. Neural networks. Neural network management.</p>			<p>personal computers</p>	<p>organization</p>	<p>principles of operation of the main types of intelligent systems and basic algorithms for learning artificial neural networks;</p> <p>2. Skills acquired by students: work with modern neural simulators and fuzzy control systems; correctly prepare data and train neural algorithmic circuits.</p> <p>3. Skills and competencies acquired by students: import data into neural simulators and fuzzy control systems, use tools that implement algorithms of artificial neural networks and fuzzy control; apply various methods of artificial neural networks and fuzzy algorithms in automation.</p>
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M1	Special	ES3113	Expert Systems	<p>The aim of the discipline: is to acquire knowledge and practical skills in creating and using expert systems to solve complex problems in various fields, including business, science and technology.</p> <p>Within the framework of this discipline, the following subjects are studied: Introduction to Expert Systems: basic concepts and concepts, applications and examples. Stages of development of expert systems: from defining requirements to creating and testing the system.</p>	5/5	7	Advanced Python Programming	Production / Pre-graduate practice, Writing a thesis (project)	<p>1. Knowledge acquired by students: demonstrate the basics of expert systems and artificial intelligence; Principles and methods of creating and operating expert systems; Methods of basic and intelligent data analysis to support decision-making.</p> <p>2. Skills acquired by students: developing expert systems and their components; Evaluating the effectiveness of expert systems and selecting the most appropriate ones for a specific task; Analyzing and modeling expert knowledge; Preparing data for creating and training expert systems.</p> <p>3. Skills and competencies acquired by students: The ability to choose and apply the most appropriate methods and algorithms for creating expert systems. Ability to develop and create expert systems capable of solving problems in various fields;; Skills in working with modern tools and technologies used in expert systems;</p>
M1	Special	MOP3113	Machine-oriented programming	<p>Purpose of studying the discipline: mastering the theoretical foundations and algorithms of machine learning, their possible practical implementations and application in problem solving.</p> <p>Within the framework of this discipline, the following subjects are studied: Introduction to machine learning. Logical models of machine learning. Decision trees. Ranking</p>	5/5	7	Programming in C#	Production / pre-graduate practice, Writing a thesis (project)	<p>1. Knowledge acquired by students: demonstrate the basic principles, methods and tasks of machine learning; logical models of machine learning; metric models of machine learning; probabilistic models of machine learning.</p> <p>2. Skills acquired by students: apply the learned methods of machine learning in solving practical problems.</p> <p>3. Skills and competencies acquired by students:</p>

				trees. Learning ordered lists of rules.					development of data analysis tools, metric models of machine learning. Using artificial neural networks.
M1	Special	MPS3114	Mobile platforms and systems	<p>The purpose of studying the discipline: mastering knowledge and practical skills in the development of mobile applications for various platforms and devices.</p> <p>Within the framework of this discipline, the following subjects are studied: architecture of mobile devices and operating systems; programming languages, frameworks and tools for developing mobile applications;</p>	5/5	7	Tools and components for 3D printing	Writing a thesis	<p>1. Knowledge acquired by students: demonstrate the architecture of mobile devices and operating systems; Basics of programming mobile applications; Methods for developing and testing mobile applications; Features of designing a user interface for mobile devices;</p> <p>2. Skills acquired by students: Design and develop mobile applications; Develop a user interface for mobile devices; Use modern tools and tools for developing mobile applications.</p> <p>3. Skills and competencies acquired by students: work with mobile application development tools and tools; work in a mobile application development team;</p>
M4	Special	SAPOBD3114	Creating analytical applications based on a database	<p>The purpose of studying the discipline: it is to acquire knowledge and skills to create effective analytical applications using databases as the basis for data storage and processing.</p> <p>Within the framework of this discipline, you will learn: The basics of creating Web Pages. Hypertext links and illustrations on Web Pages. Formatting tables. Frames and forms.</p>	5/5	7	Computer graphics and 3D visualization	Writing a thesis	<p>1. Knowledge acquired by students: demonstrate the principles of Internet applications; basic principles of cross-browser layout; principles of data exchange between clients and servers on the Internet: o rules for addressing devices on the network; o HTTP protocol; data transfer formats: o JSON; o XML .</p> <p>2. Skills acquired by students: professionally build a strategy for developing and implementing web applications; plan the architecture of web applications taking into account current development trends; identify common</p>

									characteristics of different types of data and process them using the principles of object-oriented design. 3. Skills and competencies acquired by students: use the skills of practical algorithms and data structures in solving specific problems; skills of practical application of object-oriented programming concepts; practical work on creating and developing web applications.
M4	Special	TOHBD3115	Big data processing and storage technologies Big data	<p>The purpose of studying the discipline: to master the knowledge and practical skills of working with large amounts of data, to learn how to choose and apply appropriate tools for their processing and storage.</p> <p>Within the framework of this discipline, the following subjects are studied: Big-Data. Tools. Technologies. Methods of analysis. Predictive modeling. Area of applied problems using predictive modeling.</p>	5/5	7	Database programming	Production / pre-graduate practice, Writing a thesis (project)	<p>1. Knowledge acquired by students: demonstrate basic concepts of Big Data technology; basic concepts of forecasting; basic forecasting technologies.</p> <p>2. The skills acquired by students: to identify big data arrays; to analyze big data clusters; to make various forecasts of the development of socio-political processes.</p> <p>3. Skills and competencies acquired by students: knowledge of Big data technologies for creating and maintaining big data;</p>
M1	Special	ITM3115	IT management	<p>The purpose of studying the discipline: it is to master the knowledge and skills necessary for organizing and managing information technologies in a company that ensure its effective functioning and development.</p> <p>This discipline focuses on: Virtualization systems. Modeling of corporate system components. Install additional software. Fundamentals of UNIX operating system administration.</p>	5/5	7	Database concept	Writing a thesis	<p>1. The knowledge acquired by students: demonstrate the stages of deployment of corporate systems; The role of freely distributed software in corporate information systems; The application of virtualization systems in corporate information systems; The basics of UNIX operating system administration UNIX; The basics of network programming.</p> <p>2. Skills acquired by students:</p>

				Configuring a dedicated UNIX server. Network programming.					Install and configure a dedicated UNIX server on a local network ⁴ Install virtualization systems and configure them Develop network applications built on the client-server model. 3. Skills and competencies acquired by students: Working with components of modern corporate systems; Working with virtualization systems used in corporate information systems.
M4	Special	PBD3116	Database Programming	<p>The aim of the discipline is to master the skills of designing, creating and managing databases using the SQL language and modern programming tools for effective work with data in various applications.</p> <p>Within the framework of this discipline, the following subjects are studied: Fundamentals of database construction. Database security tools. Physical implementation of database security. Data access rights management.</p>	5/5	7	Database programming	Production / pre-graduate practice, Writing a thesis (project)	<p>1. Knowledge acquired by students: demonstrate basic methods of data description and technology: analysis of information resources of the subject area; development of data models, design and maintenance of databases and their security.</p> <p>2. Skills acquired by students: to design secure databases; to analyze the degree of database security and increase the level of protection, taking into account the development of mathematical and software computing systems; to apply information integrity control tools, organize interaction with the database management system, backup and restore databases.</p> <p>3. The skills and competencies acquired by students: to carryout activities related to the design and maintenance of secure databases; to organize activities to ensure the safe processing of information on computer equipment using secure databases; to operate secure databases; to make</p>

								decisions on actions in emergency situations that arise during the operation of secure databases; to independently study and analyze the results of the mastering new methods and tools for database protection.
M4	Special	KBD3116	Database concept	<p>The purpose of studying the discipline: to master the basic principles of data organization and management, as well as to develop effective databases for information analysis.</p> <p>Within the framework of this discipline, the following subjects are studied: Fundamentals of databases. Data models. Database schemas. Structured Query Language (SQL). Normalization of databases.</p>	5/5	7	Концепция базы данных Производственная/ преддипломная практика, Написание дипломной работы (проекта)	<p>1. Knowledge acquired by students: demonstrate basic concepts of Big Data technology; basic concepts of forecasting; basic forecasting technologies.</p> <p>2. The skills acquired by students: to identify big data arrays; to analyze big data clusters; to make various forecasts of the development of socio-political processes.</p> <p>3. Skills and competencies acquired by students: master modern technologies for creating and maintaining data in SQL.</p>
M4	Special	IAD3117	IAD3117 Data mining	<p>Purpose of studying the discipline: acquire the knowledge and skills to process, analyze, and extract meaningful knowledge from large amounts of data using state-of-the-art machine learning and data analysis techniques.</p> <p>Within the framework of this discipline, the following subjects are studied: The subject of artificial intelligence research. Knowledge representation systems. Definitions, classification, and structure. Basics of fuzzy logic. Fuzzy inference systems. Fuzzy controls. Neural networks.</p>	5/5	7	Big data processing and storage technologies/ Production / pre-graduate practice, Writing a thesis (project)	<p>1. Knowledge acquired by students: demonstrate the principles of operation of the main types of intelligent systems; basic algorithms for learning artificial neural networks and fuzzy algorithms; software and hardware methods for implementing artificial neural networks and fuzzy control algorithms.</p> <p>2. The skills acquired by students: to work with modern neural simulators and fuzzy control systems; to correctly prepare data and train neural algorithmic circuits.</p> <p>3. Skills and competencies acquired by students: importing data into neural simulators and fuzzy control systems, using tools that</p>

								implement algorithms of artificial neural networks and fuzzy control.	
M4	Special	MAD3117	Methods of data analysis	<p>The purpose of studying the discipline: mastering the basics and organization of databases and computer networks.</p> <p>Within the framework of this discipline, the following subjects are studied: Fundamentals of database construction. Database security tools. Physical implementation of database security. Manage data access rights.</p>	5/5	8	IT management	Production / pre-graduate practice, Writing a thesis (project)	<p>1. Knowledge acquired by students: demonstrate the main methods of data description and technology: analysis of information resources of the subject area; development of data models, design and maintenance of databases and their security.</p> <p>2. Skills acquired by students: to design secure databases; to analyze the degree of database security and increase the level of protection, taking into account the development of mathematical and software computing systems; to apply information integrity control tools, organize interaction with the database management system, backup and restore databases.</p> <p>3. Skills and competencies acquired by students: collect, process and interpret data; work with various methods of statistical analysis, machine learning and data visualization.</p>
M5	Special	SOTSV3118	Modern cloud technologies and virtualization systems	<p>The purpose of studying the discipline: to acquire theoretical knowledge and practical skills on the architecture of "cloud" technologies, methods and features of designing "cloud" services.</p> <p>Within the framework of this discipline, the following subjects are studied: Cloud computing. Key Features Scaling. Elasticity. Multitenancy. Fault tolerance.</p>	5/5	7	Information and communication technologies	Writing a thesis (project)	<p>1. Knowledge acquired by students: demonstrate the goals and objectives of cloud technologies prerequisites for migration to the cloud basic concepts, functions and trends in the development of cloud technologies types of cloud architectures</p> <p>2. Skills acquired by students: identify automated and business processes that are more effective to transfer to the cloud evaluate possible solutions to</p>

								risks of using cloud technologies choose the optimal strategy for switching to cloud technologies 3.Skills and competencies acquired by students: determine the cost of operating software systems in the cloud by developing a company's exit strategy for using cloud technologies	
M5	Special	OOV3118	Fundamentals of cloud computing	<p>The purpose of studying the discipline: familiarization with Amazon Web Services (AWS) and technologies necessary for creating virtual environments.</p> <p>Within the framework of this discipline, the following subjects are studied: Introduction to cloud technologies. Introduction to Linux. Command-line utilities for working in Linux. Bash command interpreter. Network technologies. Virtualization. OpenStack basics.</p>	5/5	7	Information and communication technologies	Writing a thesis (project)	<p>1. Knowledge acquired by students: demonstrate obasic concepts and principles of operating system design Basics of virtualization,principles of standard Linux utilities;principles of basic network protocols Syntax and basic commands bash shell commands; basic network diagnostics tools</p> <p>2.Skills acquired by students: build theLinux operating system Create and run virtual machines in Linux; muse standard command-line utilities; nbuild the main network protocols; nwite scripts for the bash shell; ddiagnose major network errors</p> <p>3.Skills and competencies acquired by students: work in the Linux operating system; manage the life cycle of virtual machines;work with standard command-line utilities.</p>
M4	Special	KZD3119	Cryptographic data protection	<p>The purpose of studying the discipline: to gain knowledge about the advantages of cryptographic information protection and the mathematical foundations of cryptography.</p> <p>This discipline focuses on: Basic concepts of cryptography. The</p>	5/5	7	Mathematics	Writing a thesis (project)	<p>1. Students ' acquired knowledge: demonstrate mathematical knowledge of the basics cryptography; principles of symmetric and asymmetric cryptography; principles of electronic digital signature; principles of crypt analysis.</p> <p>2. Skills acquired by students:</p>

				simplest methods of encryption with a private key. Principles of building block ciphers with a private key. Encryption algorithms DES and AES.					choose cryptographic algorithms for solving specific tasks; apply cryptographic algorithms to protect information. 3. Skills and competencies acquired by students: implement cryptographic algorithms for information security in practice.
M4	Special	BOBD3119	Database security and organization	<p>The purpose of studying the discipline: to acquire the necessary theoretical knowledge on ensuring information security of computer systems and networks, as well as ways to protect computer systems from unauthorized access.</p> <p>The main threats to the security of automated information processing systems are studied in this discipline. Gamification encryption. Modern symmetric cryptosystems. Asymmetric cryptosystems. Data authentication and electronic digital signature.</p>	5/5	7	Mathematics	Writing a thesis (project)	<p>1. Knowledge acquired by students: demonstrate general statements of the problem of ensuring information security of computer systems and networks and classification of methods for its solution; methods of unauthorized access to computer information and methods of user authentication.</p> <p>2. Skills acquired by students: analyze threats and factors affecting the information security of computer systems and networks; create a plan for protecting information objects and their information interaction; choose and apply a reasonable means of protection; update the security system using update services; plan a security policy.</p> <p>3. Skills and competencies acquired by students: use of methods and means of cryptographic information protection and their application against malicious programs.</p>

- 1) Considered at the meeting of the Department "Information Technologies", protocol no. _ _ _ of _____2023 city of
- 2) Discussed and recommended at the meeting of the SHBIT Academic Committee, Protocol no. _ _ _ of _____2023 city of
- 3) **The catalog of elective subjects has been approved:**

#	Agreed with employers (organization name, position, full name)
1	"IT integra" LLP, Director-Zhalalova V. Ya
. 2	"Agile Technologies" LLP, Director-Zhilkibaev D. B.

Acting Head of the Department _____ E. L. Nuspekov

Dean's Office _____ R. A. Aimkulov