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«13» 03 2026 y.

CATALOG OF DISCIPLINES OF THE UNIVERSITY COMPONENT

EDUCATIONAL PROGRAM **6B06118 - Software Engineering**

Level of education: bachelor's degree Duration of study: 3 years Year of admission: 2026

Cycle	Component	Name of the discipline	General labor intensity		Semester	Learning Outcomes	Brief description of the discipline	Prerequisites	Post-requirements
			in academic hours	in academic credits					
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Module of natural science competencies									
BD	UC	Engineering Mathematics	150	5	1	LO1	The discipline "Engineering Mathematics" is designed to provide students with fundamental mathematical knowledge and skills necessary to solve applied problems in engineering and technical fields. The course covers the main sections of linear algebra, analytical geometry, differential and integral calculus of a function of one variable. The discipline studies mathematical methods used in the analysis, modeling and optimization of technical systems, which are key competencies for future engineers. Within the framework of the discipline, methods of interactive learning and the performance of computational and graphical work are used.	Basic school knowledge of mathematics	Probability theory and mathematical statistics, Discrete mathematics, Theory of electrical circuits
BD	UC	Probability theory and	150	5	2	LO1, LO8	Formation of students" theoretical knowledge and practical skills on the basics of probability theory and mathematical	Engineering Mathematics	The basics of artificial

		mathematical statistics					statistics as the main mathematical apparatus for building models of random phenomena, mastering methods of mathematical modeling and analysis of such phenomena. Have skills in using statistical methods to solve problems of parameter estimation and hypothesis testing.		intelligence, Neural networks
BD	UC	Software development tools	150	5	2	LO2, LO3	The discipline studies the classification of tools, methods and tools for developing programs, design methods and the life cycle of programs, a unified modeling language (UML), building a program interface. Within the framework of the discipline, the following programs are used: StarUML, LucidChart, C++, C#. Methods of active learning - computer modeling and practical analysis of the results, "brainstorming".	Fundamentals of algorithmization and programming	Programming in Python, Cloud Technologies, Innovative Design in IT, Databases, Cybersecurity, Analysis and design of software applications, Industrial practice 1
BD	UC	Discrete mathematics	120	4	2	LO1	The key concepts of discrete mathematics, including set theory, combinatorics, graphs and algorithms, are considered. Methods of logical inference, properties of finite automata and principles of algorithm construction are studied. The skills of analyzing discrete structures and solving problems related to graphs and combinatorial problems are being formed. The acquired knowledge is used to solve practical problems in computer science and other related fields.	Engineering Mathematics	Theory of electrical circuits
Professional module									
BD	UC	Programming in Python	180	6	3	LO3, LO7, LO8	Formation of students to create modern cross-platform applications in Python using the universal PyQt5 graphics platform, interaction with the Internet, office documents, databases, graphics, multimedia and printing. Within the framework of the discipline, active learning methods are used - laboratory experiments, the method of working in small groups, "brainstorming".	Fundamentals of algorithmization and programming, Software development tools	Cloud Technologies, Neural networks, VR/AR technology and development, Web programming, Basics of the internet of things,

									Industrial practice 1
BD	UC	Fundamentals of algorithmization and programming	150	5	1	LO3	The discipline is aimed at developing knowledge, skills, and practical competencies in algorithm design, the use of fundamental data structures, and the development, testing, and debugging of programs for solving information processing tasks.	Basic school knowledge of computer science	Software development tools, Programming in Python, The basics of artificial intelligence, Educational practice, Web programming, Databases, Cybersecurity, Basics of the internet of things, Industrial practice 1
BD	UC	Cloud Technologies	150	5	4	LO7, LO9	The discipline "Cloud Technologies" is aimed at studying modern methods of data storage, processing, and transmission using cloud computing. The course covers the main models of cloud services (IaaS, PaaS, SaaS), the architecture of cloud platforms, virtualization, containerization, as well as issues of security and administration of cloud infrastructure.	Software development tools, Programming in Python	Web programming
BD	UC	Occupational safety and health	150	5	5	LO12	Formation of knowledge and skills necessary to ensure safe working and living conditions. The legal and organizational foundations of occupational safety, methods of occupational risk assessment and management, means of individual and collective protection, emergency prevention, as well as measures to prevent injuries and occupational diseases are studied. Special attention is paid to the creation of a safe working environment, compliance with labor protection standards and requirements, as well as the formation of a safety culture in professional activities.	Basic knowledge of life safety	Industrial practice 2/ Pre-graduation practice
BD	UC	Theory of electrical circuits	150	5	3	LO1, LO6	Theoretical and practical training of students in the field of the theory of electrical circuits to such an extent that they can choose the necessary electrical, electronic, electrical measuring devices, be able to properly operate them and, together with specialists, draw up technical specifications for the development of electrical parts of various installations and equipment in their professional activities.	Engineering Mathematics, Discrete mathematics	Basics of the internet of things

							Within the framework of the discipline, interactive teaching methods, the calculation-analytical method, the case-task method, game methods are used.		
Information Technology and Artificial Intelligence Module									
BD	UC	3D modeling and visualization	90	3	1	LO4	The discipline "3D modeling and visualization" is devoted to the study of the basics of designing three-dimensional objects, scenes and their visualization using modern technologies and software. This course is aimed at developing students' knowledge and practical skills necessary to work in the field of digital content creation, architectural design, game development, virtual and augmented reality, as well as other creative industries	Basic school knowledge of computer science	Innovative Design in IT, Educational practice, VR/AR technology and development
BD	UC	Innovative Design in IT	90	3	3	LO2, LO3, LO11	The discipline “Innovative Design in IT” is aimed at developing skills in creating and implementing IT startups. The course covers the fundamentals of developing innovative ideas, designing digital products, teamwork, and presenting startup projects.	3D modeling and visualization, Software development tools	Industrial practice 1
BD	UC	The basics of artificial intelligence	120	4	3	LO2, LO8	The discipline introduces students to the basic concepts, methods and applications of artificial intelligence. The purpose of the course is to provide students with basic knowledge about the possibilities and applications of artificial intelligence in the modern world and their significance for various fields of activity	Fundamentals of algorithmization and programming, Probability theory and mathematical statistics	Neural networks, Knowledge bases and expert systems
Practice-oriented module									
BD	UC	Educational practice	60	2	2	LO1 – LO12	The Organization of Educational Practice Is Aimed at Ensuring Familiarization of Bachelors with the Main Areas, Objects, Areas of Professional Activity and Profiles of Training and Consolidation of Theoretical Material, as Well as Conducting Study Tours in the Branch of the Department for This Educational Program.	Fundamentals of algorithmization and programming, 3D modeling and visualization	Industrial practice 1
Professional module									
PD	UC	Neural networks	180	6	5	LO8	The study of the basic principles of organizing information processes in neurocomputer systems, the formation of logical thinking, the formation of skills in the development and implementation of software models of neurocomputer	Programming in Python, The basics of artificial	Industrial practice 2/ Pre-graduation

							systems. Within the framework of the discipline, active learning methods are used - the method of working in small groups, laboratory experiments. The Python programming language is used.	intelligence, Probability theory and mathematical statistics	practice
PD	UC	VR/AR technology and development	120	4	4	LO2, LO4	The discipline is aimed at studying the theoretical foundations and practical skills of developing virtual (VR) and augmented (AR) reality. During the course, students learn about the principles of VR/AR systems, their architecture, methods of user interaction, as well as tools and technologies used to create interactive applications. Students master the main software environments and frameworks for developing VR/AR applications, including Unity, Unreal Engine, ARKit, ARCore and Vuforia, as well as work with various hardware platforms such as virtual reality helmets, mobile AR devices and specialized controllers.	3D modeling and visualization, Programming in Python	Industrial practice 2/ Pre-graduation practice
PD	UC	Web programming	150	5	5	LO3, LO9	The discipline is designed to provide students with theoretical knowledge and practical skills in the field of modern web application development. The course covers the basics of the client and server side of web development, the architecture of web applications, the principles of interaction between the front-end and backend, as well as modern technologies and frameworks used in web programming.	Fundamentals of algorithmization and programming, Programming in Python, Databases, Cloud Technologies	Industrial practice 2/ Pre-graduation practice
PD	UC	Databases	150	5	3	LO2, LO3, LO7	Formation of skills and knowledge in the field of creating and using databases in management systems, acquiring the necessary competencies for designing the logical structure of a database, choosing a DBMS, organizing interfaces for working with a database and preparing reporting forms. The following software is used: DBMS: MSAccess, Oracle, MSSQL, etc. When studying the discipline, interactive methods of teaching case-learning, discussion are used. As part of the discipline, on-site classes are provided at the branch of the department and guest lectures by top managers.	Fundamentals of algorithmization and programming, Software development tools	Web programming, Cybersecurity, Modern DBMS in corporate systems, Analysis and design of software applications, Knowledge bases and expert systems, Industrial practice 1

Practice-oriented module									
PD	UC	Cybersecurity	180	6	4	LO9	To form an understanding of technologies for achieving information security in all areas of activity and master a systematic approach to solving the tasks set in the field of cybersecurity. Questions are included about the types of tools used to combat cyber threats, ensuring cyber security, as well as types of malware, types of attacks, protection systems, controls to achieve information security goals. Within the framework of the discipline, active learning methods are used - the method of working in small groups, "brainstorming".	Fundamentals of algorithmizatio n and programming, Software development tools, Databases	Industrial practice 2/ Pre-graduation practice
PD	UC	Modern DBMS in corporate systems	180	6	5	LO2, LO3, LO7	He studies the structure, evolution, classification of corporate DBMS, management concepts of corporate DBMS, the main concepts of corporate governance supported by modern corporate systems, the concept of CPR - planning the need for production capacity, the concept of MPR - planning the need for materials, the concept of EPR - enterprise resource planning, etc.	Databases	Industrial practice 2/ Pre-graduation practice
PD	UC	Analysis and design of software applications	180	6	5	LO2, LO3, LO9	Explores the use of object-oriented programming, compatibility issues, reliability, and reuse of .NET Framework components, the common language runtime (CLR), the .NET Framework class library, the implementation of XSL, XPath, and other XML data representation features using PHP programming languages, C#, application development tools, including Web applications using the Java language. Active learning methods are used: computer design, group work.	Software development tools, Databases	Industrial practice 2/ Pre-graduation practice
PD	UC	Knowledge bases and expert systems	180	6	5	LO2, LO8	Formation of knowledge on technologies for developing expert systems in various applications, studying their structural and functional organization, the form of representation and properties of knowledge bases, methods of processing knowledge, acquiring skills in storing and processing data and knowledge, developing the ability to apply knowledge in practice. The algorithms of Mamdani, Tsukamoto and "simplified inference" in EC, Sugeno and Larsen in EC, etc. are considered. Active learning methods: case methods, business role-playing games, group work. As part of the discipline, on-site classes are provided at the branch of the department and guest lectures by top managers.	The basics of artificial intelligence, Databases	Industrial practice 2/ Pre-graduation practice
PD	UC	Basics of the internet of	120	4	4	LO5, LO6	Students" study of the general characteristics of the technological phenomenon of the Internet of Things	Fundamentals of	Industrial practice 2/

		things					(Internet of Things, IoT), the principles of design of socio-technical systems based on modern IoT technologies for automating various processes and routine operations, as well as the formation of students" clear understanding of the possibilities of using methods of automatic perception and context analysis of "smart" devices, collective data processing algorithms and action planning, obtaining practical skills of working with appropriate tools and programs for systems such as the "Internet of Things". Understanding embedded systems, using It connections (5G, LTE, NB-IOT, 3 Gloria, SigFox, WiFi, Bluetooth). Work on IoT platforms (IoT Architects) and the use of cloud technologies. The form of control is the delivery of an individual task. Guest lectures of top managers are provided within the discipline.	algorithmizatio n and programming, Theory of electrical circuits, Programming in Python	Pre-graduation practice
PD	UC	Industrial practice 1	300	10	4	LO1 – LO12	The Main Objectives of Industrial Practice Are: Consolidation of Theoretical Knowledge and Practical Skills in the Selected Educational Program in Production Conditions, Acquisition of Experience in Organizational Work, Obtaining a Working Specialty, Formation of Practical Skills and Competencies in the Process of Mastering the Bachelor's Program. It Is Carried Out in Practice Bases at Enterprises According to This Educational Program.	Fundamentals of algorithmizatio n and programming, Software development tools, Programming in Python, Databases	Industrial practice 2/ Pre-graduation practice
PD	UC	Industrial practice 2/ Pre-graduation practice	300	10	6	LO1 – LO12	Examines the Consolidation and Enhancement of Theoretical Knowledge Acquired During the Study Process, Collects Information for the Preparation of the Graduation Thesis, Studies Advanced Industrial Practices, and Gains Independent Work Experience by Applying Analysis, Comparison, Evaluation, and Design Skills in Energy-Sector Enterprises.	Industrial practice 1, Neural networks, Web programming, Modern DBMS in corporate systems, Analysis and design of software applications	Final certification
TOTAL			**3750**	**125**					