MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION
Federal State Autonomous Educational Institution of Higher Education
"Far Eastern Federal University"
(FEFU)
INSTITUTE OF MATHEMATICS AND COMPUTER TECHNOLOGIES
(SCHOOL)

Collection
annotations of work programs of disciplines, practices

DIRECTION OF PREPARATION

09.03.02 Information systems and technologies

Undergraduate program

Digital footprint analytics

Full-time form of education
Normative period for mastering the program
(full-time education) 4 years
Starting year of preparation: 2023

Vladivostok
2023

Content

Discipline abstract

Philosophy

The total labor intensity of the discipline is 3 credits / 108 academic hours. It is a discipline of Block 1 of the obligatory part of the EP, studied in the 2nd year and ends with a test. The curriculum provides for lectures in the amount of 18 hours, practical classes for 36 hours, and hours for independent work of the student - 54 hours.
Implementation language: Russian.

Target:development of the competencies of systemic reflective thinking, which can be applied in solving individual problems of self-organization and self-development of the individual, the processes of intercultural communication and social interaction in society.

Tasks:

1) To form the necessary level of fundamental knowledge about the history of the development of reflective thinking.
2) To teach the basic techniques of systemic reflective thinking, allowing to perceive the phenomena of intercultural diversity.
3) To develop the skills of conducting intercultural communication, taking into account the difference in philosophical and ethical contexts.

For the successful study of the discipline, students must have formed a preliminary competence: UK-1 - Able to search, critically analyze and synthesize information, apply a systematic approach to solving the tasks, obtained as a result of studying the discipline "Logic". The student should be ready to study such disciplines as "Cultural codes of modernity", which form the competence of UK-5.4 - Understands culture as a set of signs and codes that allow to identify and define the intercultural diversity of society in the socio-historical, ethical and philosophical contexts.

Competences of students, indicators of their achievement and learning outcomes in the discipline

Name of the category (group) of competencies	Code and name of the competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Universal competencies	UK-4 Able to carry out business communication in oral and written forms in the state language of the Russian Federation and foreign language(s)	UK-4.2 Understands the behavioral characteristics of selected groups of people with whom he works / interacts, takes them into account in his professional activities	knows the behavior of selected groups of people in the process of communication in modern society knows how to use techniques for building integration links of communication interaction has the skills to maintain integration interaction based on the techniques of systemic reflective thinking
	UK-5 Able to perceive the intercultural diversity of society in the socio-	UK-5.1 Perceives the intercultural diversity of society and the features of	knows the philosophical foundations and the history of the formation of systemic

	historical, ethical and philosophical contexts	interaction in it in the socio-historical, ethical and philosophical contexts	reflective thinking, which allows one to perceive the intercultural diversity of society knows how to use the techniques of systemic reflective thinking to perceive and describe the intercultural diversity of society possesses the skills to perceive the socio-historical, ethical and philosophical context of the situation of intercultural interaction

For the formation of the above competencies within the framework of the discipline "Philosophy", the following educational technologies and methods of active / interactive learning are used: discussion, work in small groups, round table.

Discipline abstract

Russian history

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the obligatory part of the EP, studied in the 1st year and ends with a test. The curriculum provides for lectures in the amount of 44 hours, practical classes in the amount of 72 hours, and hours are allocated for independent work of the student - 28 hours.
Implementation language: Russian.

Purpose: formation of a holistic, objective idea of the place of Russia in the world historical process, the laws of the historical development of society.

Tasks:

- Formation of knowledge about the patterns and stages of the historical process; major events and processes in the history of Russia; features of the historical path of Russia, its role in the world community; basic historical facts and dates, names of historical figures.
- Formation of the ability to independently work with historical sources; critically comprehend historical facts and events, state them, defend their own point of view on topical issues of national and world history.
- Formation of skills of expressing one's thoughts and opinions in interpersonal communication; public speaking skills in front of an audience.
- Formation of a sense of citizenship, patriotism, respect for the historical heritage.

Competences of students, indicators of their achievement and learning outcomes in the discipline

Name of the category (group) of competencies	Code and name of the competence (the result of mastering)	Code and name of the indicator of achievement of competence	Name of the assessment indicator (the result of training in the discipline)
Communication	UK-4. Able to carry out business communication in oral and written forms in the state language of the Russian Federation and foreign language(s)	UK-4.2. Understands the peculiarities of the behavior of selected groups of people with whom he works/interacts, takes them into account in his professional activities	Knows the stages of the formation of a multinational Russian society
			Is able to characterize the ethnic and religious composition of Russian society;
			Has the skills to explain the features of interethnic interaction in Russian society
Intercultural interaction	UK-5. Able to perceive the intercultural diversity of society in the socio-historical, ethical and philosophical contexts	UK-5.1. Perceives the intercultural diversity of society and the peculiarities of interaction in it in the socio-historical, ethical and philosophical contexts	Knows the basic theories of the historical process, the main stages of world history and the history of Russia, causes of historical processes at various stages of history

			Able to identify the main stages of the historical path of Russia, to substantiate both general historical patterns and special features of the development of Russia at different stages of history; able to characterize the role and place of Russia in world history, analyze and compare historical facts, processes, phenomena
			Has the skills to explain the role of historical knowledge in the life of modern society, respects the historical and cultural heritage of Russia and the world; has the skills to conduct a reasoned discussion based on historical examples; has the skills to search and use information about the historical diversity and socio-cultural features of social development models

For the formation of the above competencies within the framework of the discipline "History" the following educational technologies and methods of active / interactive learning are used: work in small groups.

Discipline abstract

Foreign language

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the mandatory part of the EP, is studied in the 1st year and ends with exams. The curriculum provides for practical training in the amount of72 hours, as well as allocated hours for independentstudent work - 72 hours (including 54 hours for exam preparation).
Implementation language: English.

Target:promotion to a higher level of the initial level of English proficiency achieved at the previous level of education, the formation of communicative competence and its application in oral and written forms in situations of everyday communication with representatives of other cultures.

Tasks:

– systematization of existing knowledge, skills and abilities for all types of speech activity;

– increasing the initial level of foreign language proficiency achieved at the previous stage of education;

– formation by means of a foreign language of intercultural competence as an important condition for interpersonal, interethnic and international communication;

– the formation of educational and cognitive motivation and the improvement of the skills of self-educational activity in a foreign language.

For the successful study of the discipline, students must have formed preliminary competencies (communication skills in four main types of speech activity - speaking, listening, reading, writing;the ability to correctly express their thoughts orally and in writing in compliance with the rules of pronunciation, grammatical norms in English; knowledge of phonetic, spelling, lexical, grammatical language meansin accordance with the topics, areas and situations of communication studied within the framework of the school curriculum) obtained as a result of secondary general education.

The student should be ready to study such disciplines as "Management of scientific and technological projects", "Volunteer activity and volunteer movement" / "Fundamentals of inclusive education", "Conceptual principles of knowledge-intensive bioeconomic processes", "Technological entrepreneurship in biotechnology" / "Innovative biotechnologies ", “International systems for the quality and safety of goods” / “Protection of intellectual property” and others that form the competencies of UK-1, UK-2, UK-3, UK-6, UK-9, GPC-7, PC-1, PC -2.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competence, indicators of competence achievement:

Name of the category (group) of competencies	Code and name of the competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	UK-4 Able to carry	4.2. Understands the	*Knows:*modern communication

Communication	out business communication in oral and written forms in the state language of the Russian Federation and foreign language(s)	peculiarities of the behavior of selected groups of people with whom he works/interacts, takes them into account in his professional activities	technologies in the state and foreign languages; patterns of business oral and written communication. *Can:*apply in practice communication technologies, methods and methods of business communication. *Owned by:*methodology of interpersonal business communication in the state and foreign languages, using professional language forms and means
		4.3. Competently and effectively builds business oral and written communication with representatives of other nationalities and cultures in foreign languages and the state language of the Russian Federation	*Knows:*principles and rules of business communication, features of oral and written forms of speech. *Can:*to carry out competent and effective speech interaction in a professional environment. *Owned by:*culture of business speech, skills in creating business texts
Communication	UK-5 Able to perceive the intercultural diversity of society in the socio-historical, ethical and philosophical contexts	5.2. Understands the diversity of communities in different regions based on knowledge about the features of their development and interaction	*Knows*: the essence, diversity and characteristics of different cultures, their relationship and interconnection. *Can*: provide and maintain mutual understanding between representatives of different cultures and be able to build communication in a world of cultural diversity. *owns*: ways to analyze disagreements and in intercultural communication and ways to resolve them; communication skills in a multicultural world.

To form the above competencies within the framework of the "Foreign Language" discipline, the following distance learning technologies and methods of active / interactive learning are used: video consultation and online feedback, business / role-playing game, work in small groups, action learning.

The work program of the discipline "Foreign Language" is compiled in modules according to 4 levels of foreign language proficiency (Beginner, Elementary, pre-Intermediate, Intermediate), each module includes sections.

Discipline abstract

Life safety

The total labor intensity of the discipline is 4 credits / 144 academic hours. It is a discipline of the compulsory part of the curriculum, is studied in the 1st and 2nd years and ends with a credit in the 2nd and 3rd semesters. The curriculum provides for lectures in the amount of 34 hours, practical classes in the amount of 68 hours, and hours are allocated for independent work of the student - 42 hours.
Implementation language: Russian.

Target:

To equip future specialists with theoretical knowledge and practical skills for safe life at work, at home and in emergency situations of man-made and natural origin, as well as to provide fundamental knowledge in predicting and modeling the consequences of industrial accidents and disasters, developing measures in the field of environmental protection.

Tasks:

- students mastering the methods of analysis and identification of environmental hazards;
- obtaining knowledge about ways to protect people, nature, economic objects from natural and anthropogenic hazards and ways to eliminate undesirable consequences of the implementation of hazards;
- mastering by students the skills and abilities of organizing and ensuring safety at the workplace, taking into account the requirements of labor protection.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of universal competencies	Code and name of the universal competence (the result of mastering)	Code and name of the indicator of achievement of competence	Name of the assessment indicator (the result of training in the discipline)
Life safety	UK-8. Able to create and maintain safe living conditions in everyday life and in professional activities to preserve the natural environment, ensure the sustainable development of society, including in the event of a threat and the occurrence of emergencies and military conflicts	UK-8.1. Identifies dangerous and harmful factors, predicting the possible consequences of their impact in everyday life, in production activities, in emergency situations	Knows the characteristics and signs of dangerous and harmful factors, the possible consequences of their interaction, including contamination with radioactive, poisonous substances and bacterial agents, as well as general information about nuclear, chemical and biological weapons Able to establish cause-and-effect relationships between the hazard and the possible consequences of exposure, assess the potential risk and take measures for radiation, chemical and biological

			protection Owns methods for identifying dangerous and harmful factors, predicting the possible consequences of their impact in various fields of activity, including in emergency situations, and skills in using radiation, chemical, and biological protection means
		UK-8.2. Offers means and methods for preventing hazards and maintaining safe living conditions to preserve the natural environment and ensure the sustainable development of society	Knows the principles, methods and means to maintain safe living conditions and prevent hazards Able to select and apply specific means and methods of protection to ensure security in various given situations Owns tools and methods to prevent exposure to hazards and maintain safe living conditions
		UK-8.3. Develops measures to protect the population and personnel in conditions of realization of dangers, including in the event of emergencies and military conflicts	Knows the main measures necessary to protect a person from dangerous and harmful production factors, as well as in the event of natural, man-made emergencies and military conflicts, the tactical properties of the terrain, their impact on the actions of units in a combat situation; purpose, nomenclature and symbols of topographic maps Able to develop measures necessary to ensure the safety of the object of protection in the conditions of the implementation of hazards and read topographic maps of various nomenclature Possesses the ability to independently develop and justify measures to protect a person in specific conditions of the implementation of dangers, including in the event of emergencies and military conflicts, as well as the skills of navigating the

			terrain on a map and without a map
		UK-8.4 Implements methods of health-saving technologies, taking into account the physiological characteristics of the body	Knows the physiological, psychological characteristics and characteristics of the human body, the basics of a healthy lifestyle, as well as the main methods and means of providing first aid, including for wounds and injuries Knows how to choose and apply technologies for the formation of a healthy lifestyle for life safety, as well as methods and means of providing first aid, including in case of injuries and injuries Possesses basic health-saving technologies to ensure life safety, skills in the use of individual medical protective equipment and improvised means for first aid, including in case of injuries and injuries
		UK-8.5 Has a high sense of patriotism, considers the defense of the Motherland his duty and obligation, performs the assigned tasks provided for by the general military charter	Knows the trends and features of the development of modern international relations, the role and place of Russia and the world community, the main provisions of the Military Doctrine of the Russian Federation, the main provisions of the general military regulations of the RF Armed Forces, as well as factors that determine the nature, organization and methods of modern combined arms combat Knows how to assess international and domestic military-political events from the position of patriotism, correctly apply and comply with the provisions of the general military regulations of the

			RF Armed Forces Owns combat techniques, the ability to assess geopolitical events from the position of patriotism, the skills of preparing for conducting combined arms combat

Discipline abstract

physical Culture and sport

The work program of the academic discipline "Physical Culture and Sport" was developed for bachelors studying in all areas of training implemented at FEFU.

The total labor intensity of the discipline "Elective courses in physical culture and sports" is 72 academic hours. The discipline "Physical culture and sports" refers to the mandatory part of the university-wide block of disciplines in the curriculum. The curriculum provides for 2 hours of lectures, 68 hours of practical work, and 2 hours of independent work.

Implementation language: Russian

Target:formation of personal physical culture and the ability to use various means of physical culture and sports for the preservation and promotion of health, psychophysical training and self-training for future professional activities.

Tasks:

- formation of physical culture of the personality of the future professional, in demand in the modern labor market;
- development of physical qualities and abilities, improvement of the functional capabilities of the body, strengthening of individual health;
- enrichment of the individual experience of practicing special-applied physical exercises and basic sports;
- mastering the system of professionally and vitally important practical skills and abilities;
- mastering the system of knowledge about physical culture, their role in the formation of a healthy lifestyle;
- mastering the skills of creative cooperation in collective forms of physical exercises.
- hygiene, knowledge of the rules for regulating physical activity.

As a result of studying this discipline, students form the following universal competence:

Name of the category (group) of competencies	Code and name of the competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Self-organization and self-development (including health protection)	UK-7 Able to maintain the proper level of physical fitness to ensure full-fledged social and professional activities	UK-7.1 Understands the role of physical culture and sports in modern society, in human life, preparing him for social and professional activities, the importance of physical culture and sports activity in the structure of a healthy lifestyle and the	Knows: the importance of the role of physical culture and sports in modern society, in human life, preparing him for social and professional activities, the importance of physical culture and sports activity in the structure of a healthy lifestyle and the features of planning an optimal motor regimen, taking into account the conditions of future

		features of planning an optimal motor regimen, taking into account the conditions of future professional activity.	professional activity. Able to: organize independent physical education classes. Owns: the skills of planning the motor regime, taking into account professional activities.
		UK-7.2 Uses self-control methodology to determine the level of health and physical fitness in accordance with the regulatory requirements and conditions of future professional activity.	Knows the means and methods of self-control to determine the level of health and physical fitness Able to apply the basic methods of self-control in the process of physical education and sports Has the ability to determine the state of health, the level of development of physical qualities and motor skills
		UK-7.3 Maintains the proper level of physical fitness to ensure full-fledged social and professional activities, regularly doing physical exercises.	Knows the main provisions of the theory and methodology of physical culture and sports Able to ensure the preservation and strengthening of individual health with the help of basic motor actions and basic sports Owns the technologies of planning physical improvement and methods of practicing various types of motor activity

Discipline abstract

Elective courses in physical culture and sports

The work program of the discipline "Elective courses in physical culture and sports" was developed for bachelors studying in all areas of training implemented at FEFU.

The total labor intensity of the discipline "Elective courses in physical culture and sports" is 328 academic hours. The discipline "Elective courses in physical culture and sports" refers to the mandatory part of the university-wide block of disciplines in the curriculum. The curriculum provides for practical 328 hours.

Implementation language: Russian

Target:formation of personal physical culture and the ability to use various means of physical culture and sports for the preservation and promotion of health, psychophysical training and self-training for future professional activities.

Tasks:

- formation of physical culture of the personality of the future professional, in demand in the modern labor market;
- development of physical qualities and abilities, improvement of the functional capabilities of the body, strengthening of individual health;
- enrichment of the individual experience of practicing special-applied physical exercises and basic sports;
- mastering the system of professionally and vitally important practical skills and abilities;
- mastering the system of knowledge about physical culture, their role in the formation of a healthy lifestyle;
- mastering the skills of creative cooperation in collective forms of physical exercises.
- hygiene, knowledge of the rules for regulating physical activity.

As a result of studying this discipline, students form the following universal competence:

Name of the category (group) of competencies	Code and name of the competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Self-organization and self-development (including health protection)	UK-7 Able to maintain the proper level of physical fitness to ensure full-fledged social and professional activities	UK-7.1 Understands the role of physical culture and sports in modern society, in human life, preparing him for social and professional activities, the importance of physical culture and sports activity in the structure of a healthy lifestyle and the	Knows: the importance of the role of physical culture and sports in modern society, in human life, preparing him for social and professional activities, the importance of physical culture and sports activity in the structure of a healthy lifestyle and the features of planning an optimal motor regimen, taking into account the conditions of future

		features of planning an optimal motor regimen, taking into account the conditions of future professional activity.	professional activity. Able to: organize independent physical education classes. Owns: the skills of planning the motor regime, taking into account professional activities.
		UK-7.2 Uses self-control methodology to determine the level of health and physical fitness in accordance with the regulatory requirements and conditions of future professional activity.	Knows the means and methods of self-control to determine the level of health and physical fitness Able to apply the basic methods of self-control in the process of physical education and sports Has the ability to determine the state of health, the level of development of physical qualities and motor skills
		UK-7.3 Maintains the proper level of physical fitness to ensure full-fledged social and professional activities, regularly doing physical exercises.	Knows the main provisions of the theory and methodology of physical culture and sports Able to ensure the preservation and strengthening of individual health with the help of basic motor actions and basic sports Owns the technologies of planning physical improvement and methods of practicing various types of motor activity

Discipline abstract

Fundamentals of economic literacy

The total labor intensity of the discipline is 2 credits / 72 academic hours. It is a discipline of the compulsory part of the curriculum, is studied in the 2nd year and ends with a credit in the 4th semester. The curriculum provides for lectures in the amount of 18 hours, practical classes in the amount of 18 hours (including interactive 8 hours), and hours for independent work of the student - 36 hours.

Implementation language: Russian.

Target:

To form in students an understanding of the main patterns of the economic development of society, the operation of objective economic laws and market mechanisms, the foundations of financial, monetary, social and foreign economic policy, carried out in accordance with the legislation of the Russian Federation; form an intolerant attitude towards corrupt behavior.

Tasks:

- study of fundamental economic concepts, theories and laws;
- assimilation of the main economic categorical-conceptual apparatus;
- study of methods and techniques of scientific analysis of economic reality, characteristics of economic systems;
- mastering the culture of economic thinking, knowledge of its general laws;
- assimilation of techniques for solving elementary economic problems, building the simplest economic models: logical, algebraic and graphic;
- development of skills in working with legislative and other regulatory legal acts regulating the fight against corruption in various areas of life;
- development of skills in the formation of a civic position and legal awareness, ensuring the prevention of legal nihilism, countering corruption, extremism and terrorism, etc.;
- mastering the skills of social interaction based on an intolerant attitude towards corruption.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of universal competencies	Code and name of the universal competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Economic culture, including financial literacy	UK-9. Able to make informed economic decisions in various areas of life	UK-9.1. Interprets the behavior of economic entities in terms of economic theory	Knows the main patterns underlying the activities of economic entities and their role in the functioning of the economy Able to generalize and analyze the necessary economic information to solve specific theoretical and practical problems

			Owns the conceptual apparatus of the discipline and the most important economic terms
		UK-9.2. Collects, analyzes and interprets information about economic processes at the micro and macro levels	Knows the main trends in the development of the economy both at the micro and macro levels Able to analyze in interconnection economic phenomena and processes at the micro and macro levels Has the skills to search and use information about economic phenomena, events and problems

Discipline abstract

Jurisprudence

The total labor intensity of the discipline is 2 credits / 72 academic hours. It is a discipline of the obligatory part of the EP (university block of disciplines), studied at the 2nd year and ends with a test. The curriculum provides for lectures in the amount of 18 hours, practical 18 hours, and hours for independent work of the student - 36 hours.
Implementation language: Russian.

Target:build competencies inthe ability to determine the range of tasks within the set goal and choose the best ways to solve them, based on the current legal norms, available resources and restrictions; the ability to form an intolerant attitude towards corrupt behavior.

Tasks:

- formation of skills to choose and analyze the legal norms that are to be used in solving problems within the framework of the goal;
- formation of skills to choose the best ways to solve problems based on the prescriptions of legal norms;
- formation of skills to apply the rules of legal technique in documenting the decisions made;
- formation of skills to analyze the current legal norms that ensure the fight against corruption in various areas of life, as well as ways to prevent corruption and form an intolerant attitude towards it;
- formation of skills to take part in planning, organizing and holding events that ensure the formation of a civic position and the prevention of legal nihilism, including in terms of combating corruption, extremism, terrorism, etc.
- formation of skills to comply with the rules of social interaction on the basis of an intolerant attitude towards corruption;
- formation of skills for obtaining the basics of military-political and legal training for the formation of a civic position and the prevention of legal nihilism, including in terms of countering corruption, extremism, terrorism, etc.

Competences of students, indicators of their achievement and learning outcomes in the discipline

Name of the category (group) of competencies	Code and name of the competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Development and implementation of projects	UK-2 Is able to determine the range of tasks within the set goal and choose the best ways to solve them, based on the current legal norms, available resources and restrictions	UK-2.3 Selects and analyzes the legal norms that are to be used in solving problems within the framework of the goal	knows the methods, methods, means, patterns of choice and analysis of legal norms
			is able to choose and analyze the legal norms that are to be used in solving problems within the framework of the goal
			owns the skills of choosing and analyzing legal norms that are to be used in solving problems

			within the set goal
		UK-2.4 Chooses the best ways to solve problems based on the prescriptions of legal norms	knows the legal norms necessary to choose the best ways to solve problems
			is able to select and apply legal norms to solve problems
			owns the skills of choosing and applying the prescriptions of legal norms
		UK-2.5 Applies the rules of legal technique when documenting the decisions made	Knows the rules of legal technique
			knows how to apply the rules of legal technique in documenting the decisions made
			has the skills to formalize the decisions made in accordance with the norms of substantive and procedural law
civil position	UK-10 Able to form an intolerant attitude towards manifestations of extremism, terrorism, corrupt behavior and counteract them in professional activities	UK-10.1 Analyzes the current legal norms that ensure the fight against corruption in various areas of life, as well as ways to prevent corruption and form an intolerant attitude towards it	knows the essence of corrupt behavior and its relationship with social, economic, political and other conditions
			is able to analyze the current legal norms that ensure the fight against corruption in various areas of life, as well as ways to prevent corruption and form an intolerant attitude towards it
			has the skills to work with legislative and other regulatory legal acts regulating the fight against corruption in various areas of life
		UK-10.2 Takes part in planning, organizing and conducting events that ensure the formation of a civil position and the prevention of legal nihilism, including in terms of combating corruption, extremism, terrorism, etc.	knows the methods, ways and means of influencing the participants in public relations to form an intolerant attitude towards manifestations of legal nihilism, including manifestations of extremism, terrorism, corruption, etc.
			is able to implement measures that ensure the formation of a civil position and measures for legal education and prevention of legal nihilism, including in terms of combating corruption, extremism, terrorism, etc.
			owns the skills of forming a civic position and legal awareness, ensuring the

			prevention of legal nihilism, countering corruption, extremism and terrorism, etc.
		UK-10.3 Complies with the rules of social interaction based on an intolerant attitude towards corruption	knows the current legislation and norms governing social interaction based on an intolerant attitude towards corruption
			knows how to participate in public relations on the basis of an intolerant attitude towards corruption
			possesses the skills of social interaction based on an intolerant attitude towards corruption
		UK-10.4 Understands the need to obtain the basics of military-political and legal training in order to form a civic position and prevent legal nihilism, including in terms of countering corruption, extremism, terrorism, etc.	knows the main directions of the socio-economic, political and military-technical development of the Russian Federation, the legal basis for military service and the provisions of the Military Doctrine of the Russian Federation
			knows how to use the basics of military-political and legal training in the implementation of measures aimed at forming a civic position and preventing legal nihilism, including in terms of combating corruption, extremism, terrorism, etc.
			possesses the skills to apply the basics of military-political and legal training in the implementation of measures aimed at forming a civic position and preventing legal nihilism, including in terms of combating corruption, extremism, terrorism, etc.

To form the above competencies within the framework of the discipline "Law", the following educational technologies and methods of active / interactive learning are used: work in small groups, a round table.

Discipline abstract

Russian language: the effectiveness of speech communication

The total labor intensity of the discipline is 2 credit units / 72 academic hours. It is a discipline of the obligatory part of the EP, studied in the 1st year and ends with a test. The curriculum provides for practical training in the amount of 36 hours, and hours are allocated for independent work of the student - 36 hours.

Implementation language: Russian

Target:the formation of students' skills of effective speech activity, namely:

1) preparation and presentation of an oral presentation on socially significant and professionally oriented topics;

2) creation and language design of academic and official business texts of various genres.

Tasks:

- develop skills in writing academic texts of various genres (abstract, abstract, essay, scientific article);
- develop the skills of compiling official business texts of various genres (personal business papers, reporting documents, business letter);
- improve the skills of language design of the text in accordance with accepted norms, rules, standards;
- to form the skills of editing / self-editing the compiled text;
- to teach the techniques of effective oral presentation of a written text;
- to acquaint with the principles and methods of conducting a constructive discussion;
- Learn how to create an effective presentation.

Preliminary competencies are not required, knowledge in the scope of the school curriculum is sufficient.

As a result of studying this discipline, students form the following universal competencies:

Name of the category (group) of competencies	Code and name of the competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Communication	UK-4 Able to carry out business communication in oral and written forms in the state language of the Russian Federation and foreign language(s)	UK-4.2 Understands the behavioral characteristics of selected groups of people with whom he works/interacts, takes them into account in his professional activities	Knows the content of the specifics of the addressee factor in professional communication
			Able to build effective interaction with different categories of addressee
			Owns communication tactics of successful interaction with the addressee
		UK-4.3 Competently and effectively builds business oral and written communication with representatives of other nationalities and cultures in foreign languages and the	Knows the principles and rules of business communication, features of oral and written forms of speech
			Able to carry out competent and effective verbal interaction in a professional environment

		state language of the Russian Federation	Possesses the culture of business speech, the skills of creating business texts
Intercultural interaction	UK-5. Able to perceive the intercultural diversity of society in the socio-historical, ethical and philosophical contexts	UK-5.3 Takes into account the peculiarities of the cultural diversity of society, key aspects development of the Asia-Pacific region	Knows the content of key concepts and principles of intercultural communication
			Able to adapt to a foreign cultural environment, to enter into effective interaction with representatives of different socio-cultural communities
			Possesses the skills of intercultural communication, assisting in the adaptation of foreign citizens in the Russian-speaking environment

The following educational technologies and methods of active/interactive learning are used to form the above competencies within the framework of the discipline "Russian Language: Efficiency of Speech Communication": round table, dispute, discussion, business game, work in small groups.

Discipline abstract

Foundations of Russian statehood

The total labor intensity of the discipline is 2 credits / 72 academic hours. It is a discipline of the obligatory part of the EP (university-wide block of disciplines), studied at the 1st year and ends with a test with an assessment. The curriculum provides for lectures in the amount of 18 hours, practical 36 hours, and hours for independent work of the student - 18 hours.
Implementation language: Russian.

Target
To form competencies for the perception of the intercultural diversity of society in the socio-historical, ethical and philosophical contexts

Tasks:

- To form communication skills, taking into account the cultural characteristics and traditions of various social groups
- To form the skills of reasoned discussion and solving problems of an ideological, social and personal nature
- Build independent critical thinking skills

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of competencies	Code and name of the competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
civil position	UK-5 Able to perceive the intercultural diversity of society in the socio-historical, ethical and philosophical contexts	UK-5.4. Demonstrates a tolerant perception of social and cultural differences, respectful and careful attitude to the historical heritage and cultural traditions	Knows about the key meanings, ethical and ideological doctrines that have developed within the Russian civilization
			Able to maintain respectful interaction with representatives of various sociocultural communities
			Possesses communication skills, taking into account the cultural characteristics and traditions of various social groups
		UK-5.5. Finds and uses information about cultural characteristics and traditions of various social groups necessary for self-development and interaction with other people	Knows the fundamental achievements, inventions, discoveries and accomplishments related to the development of the Russian land and Russian civilization, to present them in a relevant and meaningful perspective
			Knows how to find and use information about the cultural characteristics and traditions of various social groups necessary

			for self-development and interaction with other people
			Possesses the skills of reasoned discussion and solving problems of an ideological, social and personal nature
		UK-5.6. Shows in his behavior a respectful attitude to the historical heritage and socio-cultural traditions of various social groups, based on knowledge of the stages of Russia's historical development in the context of world history and cultural traditions of the world	Knows the fundamental value principles of Russian civilization (such as diversity, sovereignty, harmony, trust and creation), as well as the promising value orientations of Russian civilizational development (such as stability, mission, responsibility and justice
			Knows how to show in his behavior a respectful attitude towards the historical heritage and socio-cultural traditions of various social groups, based on knowledge of the stages of Russia's historical development in the context of world history and cultural traditions of the world;
			Possesses a developed sense of citizenship and patriotism, skills of independent critical thinking
		UK-5.7. Consciously chooses value orientations and civic position; reasonably discusses and solves problems of an ideological, social and personal nature	Knows the features of the modern political organization of Russian society, the causal nature and specifics of its actual transformation, the value provision of traditional institutional solutions and the special polyvariance of the relationship between the Russian state and society in the federal dimension
			Able to adequately perceive current social and cultural differences, respectfully and carefully treat the historical heritage and cultural traditions
			Possesses the skills of a conscious choice of value orientations and citizenship

Discipline abstract

Fundamentals of digital literacy

The total labor intensity of the discipline is 3 credits / 108 academic hours. It is a discipline of the obligatory part of the EP, studied in the 1st year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, practical classes in the amount of 36 hours, and hours are also allocated for independent work of the student - 54 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

Form competenciesByworksewith information in the digital environment (viewing, searching, filtering data, information and digital content),creatingnyuand editingnyudigitallythcontentA(pictures, audio files, web pages, etc.), interaction in the digital environment, taking into account the norms of ethics and legal regulation of the digital space,continuouslythtrainingeniyathroughout life, using the availability of information.

Tasks:

- formation of basic skills for managing data, information and digital content;
- skills buildingwork with information in office applications (texts, tables, presentations, etc.);
- skills buildingbusiness communication in a digital collaboration environment.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of universal competencies	Code and name of the universal competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Systems and critical thinking	UK-1 Able to search, critical analysis and synthesis of information, apply a systematic approach to solve tasks	UK-1.1 Searches, collects information using computer technology	Knows the forms, methods and technologies of information retrieval Knows how to work with information in the digital environment (viewing, searching, filtering data, information and digital content) Possesses basic skills in managing data, information and digital content
		UK-1.2 Uses information products for processing and analyzing information, following the principles of critical evaluation and verification of sources	Knows the basic technologies for working with information in office applications (texts, tables, presentations, etc.) Able to create and edit digital content (drawings, audio files, web pages, etc.) Capable of analyzing, comparing and critically evaluating the validity and reliability of sources of data, information and digital content

	UK-4.1 Uses information products in business communication to achieve the goal	UK-4.1 Uses information products in business communication to achieve the goal	Knows business communication techniques in a digital environment and digital tools and technologies for collaboration Able to interact in the digital environment, taking into account the norms of ethics and legal regulation of the digital space Has the skills to securely exchange information and protect personal data
	UK-6 Able to manage their time, build and implement a trajectory of self-development based on the principles of lifelong education	UK-6.1 Uses digital tools to organize their work and self-development	Knows the technical capabilities of modern digital devices and Internet technologies Can successfully work with constantly updated digital tools Has the skills to continuously learn throughout life, using the availability of information

Discipline abstract

Fundamentals of algorithmization and programming

The total labor intensity of the discipline is 9 credits / 324 academic hours. It is a discipline of the compulsory part of the EP, studied in the 1st year and ends with a test with an assessment. The curriculum provides for lectures in the amount of 68 hours, laboratory work in the amount of 140 hours, and hours are also allocated for independent work of the student - 116 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form students' theoretical knowledge of the basic concepts in the field of programming and practical skills in compiling algorithms and writing programs.

Tasks:

- learning the C++ programming language;
- familiarity with the methods of structured and object-oriented programming;
- familiarity with the basic data structures and typical algorithms for their processing;
- development of algorithmization and programming skills;
- development of readiness to create software products for solving applied problems in various fields.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of universal competencies	Code and name of the universal competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Systems and critical thinking	UK-1 Able to search, critical analysis and synthesis of information, apply a systematic approach to solve tasks	UK-1.1 Searches, collects information using computer technology	Knows the forms, methods and technologies of information retrieval Knows how to work with information in the digital environment (viewing, searching, filtering data, information and digital content) Possesses basic skills in managing data, information and digital content

		UK-1.2 Uses information products for processing and analyzing information, following the principles of critical evaluation and verification of sources	Knows the basic technologies for working with information in office applications (texts, tables, presentations, etc.) Able to create and edit digital content (drawings, audio files, web pages, etc.) Capable of analyzing, comparing and critically evaluating the validity and reliability of sources of data, information and digital content

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-6 Able to develop algorithms and programs suitable for practical application in the field of information systems and technologies;	GPC-6.1 Defines methods of algorithmization, programming languages and technologies suitable for practical application in the field of information systems and technologies	Knows the main methods of algorithmization, programming languages and technologies Able to analyze algorithmization methods, programming languages and technologies Possesses the skills of a reasonable choice of algorithmization methods, programming languages and technologies suitable for practical application in the field of information systems and technologies
		GPC-6.2 Applies algorithmization methods, programming languages and technologies in solving professional problems in the field of information systems and technologies	Knows the methodology for applying algorithmization methods, programming languages and technologies in solving professional problems in the field of information systems and technologies Able to solve professional problems in the field of information systems

			and technologies using algorithmization methods, programming languages and technologies Has the skills to apply algorithmization methods, programming languages and technologies in solving professional problems in the field of information systems and technologies
		GPC-6.3 Programming, debugging and testing prototypes of software and hardware systems	Knows the main approaches to the process of programming, debugging and testing prototypes of software and hardware systems Able to carry out programming, debugging and testing prototypes of software and hardware systems Has the skills to create prototypes of software and hardware systems, including their programming, debugging and testing

Discipline abstract

Basics of project activity

The total labor intensity of the discipline is 3 credits / 108 academic hours. It is a discipline of the obligatory part of the EP, studied in the 1st year and ends with a test. The curriculum provides for lectures in the amount of 18 hours, practical classes in the amount of 36 hours, and hours are also allocated for independent work of the student - 54 hours.

Implementation language: Russian.

Target:

Form competencies in the field of project activities.

Tasks:

- skills buildingapplication of tools from various fields of knowledge to solve tasks;
- formation of skills for solving multi-level tasks in achieving the goal;
- formation of skills by team building skills.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of universal competencies	Code and name of the universal competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Development and implementation of projects	UK-2 Is able to determine the range of tasks within the set goal and choose the best ways to solve them, based on the current legal norms, available resources and restrictions	UK-2.1 Applies tools and methods from various fields of knowledge to solve assigned problems	Able to apply tools from various fields of knowledge to solve problems Owns methods for solving tasks from various fields of knowledge Knows the methods of solving problems within the framework of the goal
		UK-2.2 Determines how to solve the problem within the goal	Knows the methods of solving problems within the framework of the goal Able to solve multi-level tasks in order to achieve the set goal Has the skills to make decisions within the framework of the goal

Teamwork and Leadership	UK-3 Able to carry out social interaction and realize his role in the team	UK-3.1 Uses cooperative strategies to achieve the set goal, defines his role in the team	Knows existing cooperation strategies when organizing teamwork Able to determine his role in the team in solving tasks Possesses team building skills
		UK-3.2 Takes initiative when working in a team	Able to initiate problem solving when working in a team Possesses entrepreneurial skills, including when working in a team

Discipline abstract

Project workshop

The total labor intensity of the discipline is 2 credit units / 72 academic hours. It is a discipline of the obligatory part of the EP, studied in the 1st year and ends with a test. The curriculum provides for practical training in the amount of 36 hours, and hours are also allocated for independent work of the student - 36 hours.

Implementation language: Russian.

Target:

Build competencies forpractical work in projects.

Tasks:

- skills buildingsolving problems within the goal;
- skills buildingdetermining the role in the team in solving the tasks;
- formationentrepreneurial skills, including teamwork.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of universal competencies	Code and name of the universal competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Development and implementation of projects	UK-2 Is able to determine the range of tasks within the set goal and choose the best ways to solve them, based on the current legal norms, available resources and restrictions	UK-2.1 Applies tools and methods from various fields of knowledge to solve assigned problems	Able to apply tools from various fields of knowledge to solve problems Owns methods for solving tasks from various fields of knowledge Knows the methods of solving problems within the framework of the goal
		UK-2.2 Determines how to solve the problem within the goal	Knows the methods of solving problems within the framework of the goal Able to solve multi-level tasks in order to achieve the set goal Has the skills to make decisions within the framework of the goal
Teamwork and Leadership	UK-3 Able to carry out social interaction and realize his role in the team	UK-3.1 Uses cooperative strategies to achieve the set goal, defines his role in the team	Knows existing cooperation strategies when organizing teamwork Able to determine his role in the team in solving tasks Possesses team

			building skills
		UK-3.2 Takes initiative when working in a team	Able to initiate problem solving when working in a team Possesses entrepreneurial skills, including when working in a team
Self-organization and self-development (including health protection)	UK-6 Able to manage their time, build and implement a trajectory of self-development based on the principles of lifelong education	UK-6.1 Uses digital tools to organize their work and self-development	Knows the technical capabilities of modern digital devices and Internet technologies Can successfully work with constantly updated digital tools Has the skills to continuously learn throughout life, using the availability of information

Discipline abstract

Mathematical analysis

The total labor intensity of the discipline is 10 credits / 360 academic hours. It is a discipline of the compulsory part of the EP, studied in the 1st year in 1, 2 semesters and ends with an exam in each semester. The curriculum provides for lectures in the amount of 136 hours, practical classes in the amount of 140 hours, hours are allocated for independent work of the student - 84 hours, 2 tests and 2 calculation and graphic tasks are provided.

Implementation language: Russian.

Target:the acquisition by students of knowledge, skills and abilities at the level of the requirements for the mathematical preparation of core requisite disciplines within the framework of the educational program for their further application in professionaldactivities; development of students' logical thinking; increasing the level of mathematical literacy and culture.

Tasks:

– getting students knowledge of basic mathematical concepts, formulas, statements and methods for solving problems;

– formation of skills to solve typical mathematical problems;

– formation of mathematical skills in relation to solving applied problems that arise in professional activities.

For the successful study of the discipline, students should have the following preliminary competencies: subject competencies, in the course of mathematics of secondary (complete) education; the student should be ready to study such disciplines as probability theory, physics, which form competencies: GPC-1 "Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities."

Competencies of students, indicators of their achievement and learning outcomes in the discipline:

Name of the category (group) of competencies	Code and name competencies (the result of mastering)	Code and name of the indicator of achievement of competence	Name of the assessment indicator (the result of training in the discipline)
	GPC-1 Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities	GPC -1.1 Defines the tools of mathematics, physics, computing and programming necessary for solving professional problems	knows the theoretical foundations of mathematical analysis is able to choose the best method for solving a practical problem owns the skills of applying the methods of mathematical analysis to solving practical problems
		GPC -1.2 Solves standard professional problems using natural science and general engineering	knows the theoretical foundations of mathematical analysis is able to choose the best

		knowledge, methods of mathematical analysis and modeling	method for solving a practical problem owns the skills of applying the methods of mathematical analysis to solving practical problems
		GPC -1.3 Carries out theoretical and experimental research of objects of professional activity	knows the theoretical foundations of mathematical analysis is able to choose the best method for solving a practical problem owns the skills of applying the methods of mathematical analysis to solving practical problems

For the formation of the above competencies within the framework of the discipline "Mathematical Analysis", the following educational technologies and methods of active / interactive learning are used: presentation, problematic lecture, multi-level tasks.

Discipline abstract

Linear algebra

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the compulsory part of the EP, studied in the 1st year in the 1st semester and ends with an exam. The curriculum provides for lectures in the amount of 32 hours, practical classes in the amount of 34 hours, hours are allocated for independent work of the student - 78 hours, 2 tests and 2 calculation and graphic tasks are provided.

Implementation language: Russian.

Target:

the acquisition by students of knowledge, skills and abilities at the level of requirements for the mathematical preparation of corrective disciplines within the framework of the educational program for their further application in professional activities; development of students' logical thinking; increasing the level of mathematical literacy and culture.

Tasks:

- formation of a system of ideas about the concepts and facts of the discipline "Linear Algebra" among students;
- formation of a system of ideas about linear algebra and the possibilities of their application among students;
- formation of ideas about the importance (necessity) of studying linear algebra for the implementation of future professional activities;
- education of professionally significant personal qualities of students;
- the formation of students' understanding of the possibilities of algebra for the development of universal learning activities of students.

For the successful study of the discipline, students should have the following preliminary competencies: subject competencies, in the course of mathematics of secondary (complete) education; the student should be ready to study such disciplines as mathematical analysis, analytical geometry, probability theory, computational methods of computer systems that form competencies: GPC-1 “Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities”, PC-1 “Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results”, PC-4 “Able to develop software using programming languages,

Competencies of students, indicators of their achievement and learning outcomes in the discipline:

Name of the category (group) of competencies	Code and name competencies (the result of mastering)	Code and name of the indicator of achievement of competence	Name of the assessment indicator (the result of training in the discipline)

	GPC-1 Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities	GPC -1.1 Defines the tools of mathematics, physics, computing and programming necessary for solving professional problems	knows the theoretical foundations of linear algebra is able to choose the best method for solving a practical problem possesses the skills of applying linear algebra methods to solving practical problems
		GPC -1.2 Solves standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling	knows the theoretical foundations of linear algebra is able to choose the best method for solving a practical problem possesses the skills of applying linear algebra methods to solving practical problems
		GPC -1.3 Carries out theoretical and experimental research of objects of professional activity	knows the theoretical foundations of linear algebra is able to choose the best method for solving a practical problem possesses the skills of applying linear algebra methods to solving practical problems

Discipline abstract

Analytic geometry

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the mandatory part of the EP, studied in the 1st year in the 2nd semester and ends with an exam. The curriculum provides for lectures in the amount of 36 hours, practical classes in the amount of 36 hours, hours are allocated for independent work of the student - 72 hours, 2 tests and 2 calculation and graphic tasks are provided.

Implementation language: Russian.

Target:

the acquisition by students of knowledge, skills and abilities at the level of requirements for the mathematical preparation of corrective disciplines within the framework of the educational program for their further application in professional activities; development of students' logical thinking; increasing the level of mathematical literacy and culture.

Tasks:

- formation of a system of ideas about the concepts and facts of the discipline "Analytical geometry" among students;
- formation of a system of ideas about analytical geometry and the possibilities of their application among students;
- formation of ideas about the importance (necessity) of studying analytical geometry for the implementation of future professional activities;
- education of professionally significant personal qualities of students;
- the formation of students' understanding of the possibilities of geometry for the development of universal learning activities of students.

For the successful study of the discipline, students should have the following preliminary competencies: GPC-1 “Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities”, obtained as a result of studying disciplines: linear algebra; subject competencies, in the course of mathematics of secondary (complete) education; the student should be ready to study such disciplines as mathematical analysis, information theory and coding, which form competencies: GPC-1 “Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities”,

Competences of students, indicators of their achievement and learning outcomes in the discipline

Name of the category (group) of competencies	Code and name competencies (the result of mastering)	Code and name of the indicator of achievement of competence	Name of the assessment indicator (the result of training in the discipline)
	GPC-1 Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities	GPC -1.1 Defines the tools of mathematics, physics, computing and programming necessary for solving professional problems	knows the theoretical foundations of analytic geometry is able to choose the best method for solving a practical problem owns the skills of applying the methods of analytical geometry to solving practical problems
		GPC -1.2 Solves standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling	knows the theoretical foundations of analytic geometry is able to choose the best method for solving a practical problem owns the skills of applying the methods of analytical geometry to solving practical problems
		GPC -1.3 Carries out theoretical and experimental research of objects of professional activity	knows the theoretical foundations of analytic geometry is able to choose the best method for solving a practical problem owns the skills of applying the methods of analytical geometry to solving practical problems

Discipline abstract

Discrete Math

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the mandatory part of the EP, studied in the 1st year in the 2nd semester and ends with an exam. The curriculum provides for lectures in the amount of 36 hours, practical classes in the amount of 36 hours, hours are allocated for independent work of the student - 72 hours, 2 tests and 2 calculation and graphic tasks are provided.
Implementation language: Russian.

Target:

acquisitionstudents of knowledge, skills and abilities at the level of requirements for mathematical training within the framework of the educational program for their further application in professional activities; development of students' logical and algorithmic thinking; increasing the level of mathematical literacy and culture.

Tasks:

– getting students knowledge of the main sections of discrete mathematics;

– formation of skills for using methods of discrete mathematics in the study of special disciplines of the educational program and application to solving applied problems that arise in professional activities;

– education of professionally significant personal qualities of students.

For the successful study of the discipline, students should have the following preliminary competencies: GPC-1 “Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities”, obtained as a result of studying the disciplines: mathematical analysis, linear algebra , subject competencies, in the course of mathematics of secondary (complete) education; the student should be ready to study such disciplines as high-performance computing, information theory and coding, which form competencies: GPC-1 “Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities”,

Competences of students, indicators of their achievement and learning outcomes in the discipline

Name of the category (group) of general professional competencies	Code and name of general professional competence (result of development)	Code and name of the indicator of achievement of competence	Name of the assessment indicator (the result of training in the discipline)
	GPC-1 Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in	GPC-1.1 Defines the tools of mathematics, physics, computing and programming necessary for solving professional problems	Knows the theoretical foundations of discrete mathematics. Able to solve standard problems in the main sections of the discrete. Owns methods for constructing the simplest mathematical

Name of the category (group) of general professional competencies	Code and name of general professional competence (result of development)	Code and name of the indicator of achievement of competence	Name of the assessment indicator (the result of training in the discipline)
	professional activities		models of typical professional tasks
		GPC-1.2 Solves standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling	Knows applications of propositional algebra, basic problems of graph theory and algorithms on graphs. Knows how to solve the main problems of graph theory, use algorithms on graphs in practical applications. Owns methods of building computer and physical models of typical professional tasks
		GPC-1.3 carries out theoretical and experimental research of objects of professional activity	Knows the scope of methods and models of discrete mathematics Able to apply the methods and models of discrete mathematics in the tasks of professional activity He owns modern mathematical apparatus and tools of discrete mathematics for solving problems in his subject area, including those implemented using computer technology.

For the formation of the above competencies within the discipline "Discrete Mathematics" the following educational technologies and methods of active / interactive learning are used: presentation, problematic lecture, multi-level tasks, work in small groups.

Discipline abstract

Information systems tools

The total labor intensity of the discipline is 3 credits / 108 academic hours. It is a discipline of the obligatory part of the EP, studied in the 2nd year and ends with a test. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 34 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 56 hours.

Implementation language: Russian.

Target:

Formation of general theoretical ideas and concepts about the organization and principles of construction, functioning of software tools of information systems.

Tasks:

- form a holistic view of the principles of construction and operation of modern software;
- learn the basics of software tools for data analysis;
- gain skills in building and researching software tools for data analysis on a computer.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-2 Able to understand the principles of operation of modern information technologies and software, including domestic production, and use them in solving problems of professional activity	GPC-2.1 Analyzes the need for the use of modern information technologies and software, including domestic production, in solving problems of professional activity	Knows modern information technologies and software, including domestic production Able to analyze modern information technologies and software, including domestic production Possesses the skills to substantiate the need for the use of modern information technologies and software, including domestic production, in solving problems of professional activity
		GPC-2.2 Selects modern information technologies and software, including domestic production, when solving problems of professional activity	Knows a wide range of modern information technologies and software, including domestic production Able to critically compare modern information technologies and software, including domestic production Possesses the skills of a reasonable choice of modern information technologies and software, including domestic production, in solving problems of professional activity

		GPC-2.3 Uses modern information technologies and software, including domestic production, in solving problems of professional activity	Knows the methodology of applying modern information technologies and software in solving problems of professional activity Able to solve problems of professional activity using modern information technologies and software, including domestic production Has the skills to apply modern information technologies and software, including domestic production, in solving problems of professional activity
	GPC-7 Able to select platforms and software and hardware tools for the implementation of information systems	GPC-7.1 Analyzes platforms, technologies and software and hardware tools for the implementation of information systems	Knows the main platforms, technologies and software and hardware tools for the implementation of information systems Is able to determine the key characteristics of platforms, technologies and software and hardware tools for the implementation of information systems Has the skills to analyze platforms, technologies and software and hardware tools for the implementation of information systems
		GPC-7.2 Selects platforms and software and hardware tools for the implementation of information systems	Knows a wide range of platforms and software and hardware tools for implementing information systems Able to critically compare platforms and software and hardware tools for the implementation of information systems Possesses the skills of a reasonable choice of platforms and instrumental software and hardware for the implementation of information systems
		GPC-7.3 Applies modern technologies for the implementation of information systems	Knows modern technologies for the implementation of information systems Knows how to justify the need to use modern technologies for the implementation of information systems Has the skills to apply modern technologies for the implementation of information systems

Discipline abstract

Information systems architecture

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the obligatory part of the EP, studied in the 2nd year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 32 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

Mastering the methodological foundations of designing the architecture of information systems, mastering the tools for system and detailed design of AIS and AIT.

Tasks:

- study of the main standards for designing the architecture of information systems;
- acquisition of skills and abilities on the methodological foundations of IS architecture design;
- acquisition of skills and abilities in applying the methods of system and detailed design of IS architecture, mastering the appropriate design tools.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-2 Able to understand the principles of operation of modern information technologies and software, including domestic production, and use them in solving problems of professional activity	GPC-2.1 Analyzes the need for the use of modern information technologies and software, including domestic production, in solving problems of professional activity	Knows modern information technologies and software, including domestic production Able to analyze modern information technologies and software, including domestic production Possesses the skills to substantiate the need for the use of modern information technologies and software, including domestic production, in solving problems of professional activity
		GPC-2.2 Selects modern information technologies and software, including domestic production, when solving problems of professional activity	Knows a wide range of modern information technologies and software, including domestic production Able to critically compare modern information technologies and software, including domestic production Possesses the skills of a reasonable choice of modern information technologies and software, including domestic production, in solving problems of

			professional activity
		GPC-2.3 Uses modern information technologies and software, including domestic production, in solving problems of professional activity	Knows the methodology of applying modern information technologies and software in solving problems of professional activity Able to solve problems of professional activity using modern information technologies and software, including domestic production Has the skills to apply modern information technologies and software, including domestic production, in solving problems of professional activity
	GPC-7 Able to select platforms and software and hardware tools for the implementation of information systems	GPC-7.1 Analyzes platforms, technologies and software and hardware tools for the implementation of information systems	Knows the main platforms, technologies and software and hardware tools for the implementation of information systems Is able to determine the key characteristics of platforms, technologies and software and hardware tools for the implementation of information systems Has the skills to analyze platforms, technologies and software and hardware tools for the implementation of information systems
		GPC-7.2 Selects platforms and software and hardware tools for the implementation of information systems	Knows a wide range of platforms and software and hardware tools for implementing information systems Able to critically compare platforms and software and hardware tools for the implementation of information systems Possesses the skills of a reasonable choice of platforms and instrumental software and hardware for the implementation of information systems
		GPC-7.3 Applies modern technologies for the implementation of information systems	Knows modern technologies for the implementation of information systems Knows how to justify the need to use modern technologies for the implementation of information systems Has the skills to apply modern technologies for the implementation of information systems

Discipline abstract

Infocommunication systems and networks

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the obligatory part of the EP, studied in the 2nd year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 32 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form a system of structured knowledge among students on the basics of infocommunication systems and computer networks; to develop a conceptual approach for students when justifying the choice of an infocommunication system for performing any tasks on a computer and using the appropriate tools; to form students' skills in describing information networks, as well as their classification systems based on modern approaches and requirements for computing and information systems; to form knowledge in the field of modern trends in the development of computer software.

Tasks:

- expanding the horizons and erudition of students in the field of information technology;
- formation of knowledge and skills in the field of information technology for their subsequent use in network administration, as well as solving scientific and applied problems using computer technology;
- generalization of students' knowledge in the field of information technology in order to unify knowledge and skills in the field of network administration, improve their qualifications and skills in the field of professional activity while stimulating their desire for self-development;
- studying the basic principles of building information networks, the most common algorithms for accessing the transmission medium, typical data structures used to ensure the operation of information networks;
- obtaining practical skills for implementing these principles, algorithms, structures in modern information networks.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-3 Able to solve standard tasks of professional activity based on information and bibliographic culture using information and communication technologies and	GPC-3.1 Analyzes the principles, methods and means of solving standard problems of professional activity based on information and bibliographic	Knows the basics of information and bibliographic culture, the basic requirements of information security Able to apply information and communication technologies to search and analyze the principles, methods and means of solving standard problems of professional

	taking into account the basic requirements of information security	culture using information and communication technologies and taking into account the basic requirements of information security	activity Has the skills to analyze the principles, methods and means of solving standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security
		GPC-3.2 Solves standard tasks of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security	Knows the methodology for solving standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security Knows how to choose methods for solving standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security Has the skills to solve standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security
		GPC-3.3 Compiles reviews, annotations, abstracts, scientific reports, publications and bibliography on research work, taking into account information security requirements	Knows the basic principles of compiling reviews, annotations, abstracts, scientific reports, publications and bibliography on research work Able to collect and analyze information necessary for compiling reviews, annotations, abstracts, scientific reports, publications and bibliography on research work, taking into account the requirements of information security Possesses the skills of compiling reviews, annotations, abstracts, scientific reports, publications and bibliography on research work, taking into account the requirements of information security
	OPK-5 Able to install software and hardware for information and	GPC-5.1 Performs system administration,	Knows the basic principles and modern standards of system administration, DBMS

	automated systems	DBMS administration, using modern standards for information interaction between systems	administration Able to carry out system administration, DBMS administration, using modern standards of information interaction of systems Possesses the skills of system administration, DBMS administration, using modern standards of information interaction of systems
		GPC-5.2 Performs parametric configuration of information and automated systems	Knows the main parameters of information and automated systems and the principles of their settings Able to carry out parametric adjustment of information and automated systems Possesses the skills of parametric adjustment of information and automated systems in order to increase the efficiency of their work
		GPC-5.3 Installs software and hardware for information and automated systems	Knows the basic principles of software and hardware installation of information and automated systems Able to install software and hardware of information and automated systems Has the skills to install software and hardware for information and automated systems

Discipline abstract

OS

The total labor intensity of the discipline is 5 credits / 180 academic hours. It is a discipline of the obligatory part of the EP, studied in the 2nd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 108 hours (including 27 hours for preparing for exams).

Target:

To form a system of structured knowledge among students on the basics of operating systems; develop a conceptual approach for students in justifying the choice of an operating system and using the appropriate tools; to form the skills of describing the architecture of operating systems, as well as their classification systems based on modern approaches and requirements for computing and information systems.

Tasks:

- studying the basic principles of building operating systems, the most common algorithms for performing various functions of operating systems, typical data structures used to ensure the operation of operating systems;
- obtaining practical skills for implementing these principles, algorithms, structures in the most common modern operating systems.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	OPK-5 Able to install software and hardware for information and automated systems	GPC-5.1 Performs system administration, DBMS administration, using modern standards for information interaction between systems	Knows the basic principles and modern standards of system administration, DBMS administration Able to carry out system administration, DBMS administration, using modern standards of information interaction of systems Possesses the skills of system administration, DBMS administration, using modern standards of information interaction of systems
		GPC-5.2 Performs parametric configuration of information and automated systems	Knows the main parameters of information and automated systems and the principles of their settings Able to carry out parametric adjustment of information and automated systems Possesses the skills of parametric adjustment of information and automated systems in order to increase the efficiency of their work

		GPC-5.3 Installs software and hardware for information and automated systems	Knows the basic principles of software and hardware installation of information and automated systems Able to install software and hardware of information and automated systems Has the skills to install software and hardware for information and automated systems
	GPC-7 Able to select platforms and software and hardware tools for the implementation of information systems	GPC-7.1 Analyzes platforms, technologies and software and hardware tools for the implementation of information systems	Knows the main platforms, technologies and software and hardware tools for the implementation of information systems Is able to determine the key characteristics of platforms, technologies and software and hardware tools for the implementation of information systems Has the skills to analyze platforms, technologies and software and hardware tools for the implementation of information systems
		GPC-7.2 Selects platforms and software and hardware tools for the implementation of information systems	Knows a wide range of platforms and software and hardware tools for implementing information systems Able to critically compare platforms and software and hardware tools for the implementation of information systems Possesses the skills of a reasonable choice of platforms and instrumental software and hardware for the implementation of information systems
		GPC-7.3 Applies modern technologies for the implementation of information systems	Knows modern technologies for the implementation of information systems Knows how to justify the need to use modern technologies for the implementation of information systems Has the skills to apply modern technologies for the implementation of information systems

Discipline abstract

Security of information systems and protection of information in networks

The total labor intensity of the discipline is 5 credits / 180 academic hours. It is a discipline of the obligatory part of the EP, studied in the 2nd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 108 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

Formation of students' knowledge system in the field of information security and practical application of methods and means of information protection.

Tasks:

- to form a holistic view of the essence and concept of information security, the characteristics of its components; the place of information security in the national security system of the country; sources of threats to information security and measures to prevent them; life cycles of confidential information in the process of its creation, processing, transmission; modern means and methods of ensuring information security;
- teach to analyze threats to information security, to perform the main stages of solving problems of information security and information protection.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-3 Able to solve standard tasks of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security	GPC-3.1 Analyzes the principles, methods and means of solving standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security	Knows the basics of information and bibliographic culture, the basic requirements of information security Able to apply information and communication technologies to search and analyze the principles, methods and means of solving standard problems of professional activity Has the skills to analyze the principles, methods and means of solving standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security
		GPC-3.2 Solves standard tasks of professional activity based on information and	Knows the methodology for solving standard problems of professional activity based on information and bibliographic culture using information and communication

		bibliographic culture using information and communication technologies and taking into account the basic requirements of information security	technologies and taking into account the basic requirements of information security Knows how to choose methods for solving standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security Has the skills to solve standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security
		GPC-3.3 Compiles reviews, annotations, abstracts, scientific reports, publications and bibliography on research work, taking into account information security requirements	Knows the basic principles of compiling reviews, annotations, abstracts, scientific reports, publications and bibliography on research work Able to collect and analyze information necessary for compiling reviews, annotations, abstracts, scientific reports, publications and bibliography on research work, taking into account the requirements of information security Possesses the skills of compiling reviews, annotations, abstracts, scientific reports, publications and bibliography on research work, taking into account the requirements of information security
	OPK-5 Able to install software and hardware for information and automated systems	GPC-5.1 Performs system administration, DBMS administration, using modern standards for information interaction between systems	Knows the basic principles and modern standards of system administration, DBMS administration Able to carry out system administration, DBMS administration, using modern standards of information interaction of systems Possesses the skills of system administration, DBMS administration, using modern standards of information interaction of systems
		GPC-5.2 Performs parametric configuration of information and automated systems	Knows the main parameters of information and automated systems and the principles of their settings Able to carry out parametric adjustment of information and

			automated systems Possesses the skills of parametric adjustment of information and automated systems in order to increase the efficiency of their work
		GPC-5.3 Installs software and hardware for information and automated systems	Knows the basic principles of software and hardware installation of information and automated systems Able to install software and hardware of information and automated systems Has the skills to install software and hardware for information and automated systems

Discipline abstract

Information systems programming technologies

The total labor intensity of the discipline is 9 credits / 324 academic hours. It is a discipline of the obligatory part of the EP, studied in the 2nd year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 134 hours (including 48 hours in an interactive form), and hours are also allocated for independent work of the student - 174 hours (including 54 hours for preparing for exams).

Implementation language: Russian.

Target:

To form a terminological foundation for students on the basics of programming technology, modular programming, design methods: top-down and bottom-up, debugging, testing, verification, program quality characteristics, CASE technologies.

Tasks:

- study the principles of object-oriented design and programming;
- study the processes of the life cycle of programs and modern methods of organizing software development;
- acquire the skills and abilities of object-oriented programming;
- to study the software certification process and the characteristics of the software tool quality assessment, the features of the software tool design stage.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-6 Able to develop algorithms and programs suitable for practical application in the field of information systems and technologies;	GPC-6.1 Defines methods of algorithmization, programming languages and technologies suitable for practical application in the field of information systems and technologies	Knows the main methods of algorithmization, programming languages and technologies Able to analyze algorithmization methods, programming languages and technologies Possesses the skills of a reasonable choice of algorithmization methods, programming languages and technologies suitable for practical application in the field of information systems and technologies
		GPC-6.2 Applies algorithmization methods, programming languages and technologies in solving professional problems in the field of information systems and technologies	Knows the methodology for applying algorithmization methods, programming languages and technologies in solving professional problems in the field of information systems and technologies Able to solve professional problems in the field of information systems and technologies using

			algorithmization methods, programming languages and technologies Has the skills to apply algorithmization methods, programming languages and technologies in solving professional problems in the field of information systems and technologies
		GPC-6.3 Programming, debugging and testing prototypes of software and hardware systems	Knows the main approaches to the process of programming, debugging and testing prototypes of software and hardware systems Able to carry out programming, debugging and testing prototypes of software and hardware systems Has the skills to create prototypes of software and hardware systems, including their programming, debugging and testing

Discipline abstract

Fundamentals of system analysis

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the obligatory part of the EP, studied in the 2nd year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours (including 16 hours in an interactive form), practical classes in the amount of 32 hours, and hours are also allocated for independent work of the student - 96 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of system analysis.

Tasks:

- give a general idea of the subject area of system analysis;
- identify problems that arise in system analysis;
- study the basic principles of system analysis;
- consideration of various approaches to system analysis;
- studying the basics of system analysis technology;
- master the methodology of system analysis;
- to form the skills of system analysis;
- develop the skills and abilities of system analysis.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of universal competencies	Code and name of the universal competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Systems and critical thinking	UK-1 Able to search, critical analysis and synthesis of information, apply a systematic approach to solve tasks	UK-1.1 Searches, collects information using computer technology	Knows the forms, methods and technologies of information retrieval Knows how to work with information in the digital environment (viewing, searching, filtering data, information and digital content) Possesses basic skills in managing data, information and digital content
		UK-1.2 Uses information products for processing and analyzing information, following the principles of critical evaluation and verification of sources	Knows the basic technologies for working with information in office applications (texts, tables, presentations, etc.) Able to create and edit digital content (drawings, audio files, web pages, etc.) Capable of analyzing, comparing and critically evaluating the validity and reliability of sources of data, information and digital content

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-3 Able to solve standard tasks of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security;	GPC-3.1 Analyzes the principles, methods and means of solving standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security	Knows the basics of information and bibliographic culture, the basic requirements of information security Able to apply information and communication technologies to search and analyze the principles, methods and means of solving standard problems of professional activity Has the skills to analyze the principles, methods and means of solving standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security
		GPC-3.2 Solves standard tasks of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security	Knows the methodology for solving standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security Knows how to choose methods for solving standard problems of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security Has the skills to solve standard problems of professional activity based on information and bibliographic culture using

			information and communication technologies and taking into account the basic requirements of information security
		GPC-3.3 Compiles reviews, annotations, abstracts, scientific reports, publications and bibliography on research work, taking into account information security requirements	Knows the basic principles of compiling reviews, annotations, abstracts, scientific reports, publications and bibliography on research work Able to collect and analyze information necessary for compiling reviews, annotations, abstracts, scientific reports, publications and bibliography on research work, taking into account the requirements of information security Possesses the skills of compiling reviews, annotations, abstracts, scientific reports, publications and bibliography on research work, taking into account the requirements of information security
	GPC-8 Able to apply mathematical models, methods and tools for designing information and automated systems.	GPC-8.1 Analyzes the methodology and basic methods of mathematical modeling, classification and conditions for the use of models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems	Knows the methodology and basic methods of mathematical modeling, classification and conditions for applying models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems Able to analyze the methodology and basic methods of mathematical modeling, classification and conditions for the use of models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems Possesses the skills of critical analysis of the methodology and basic methods of mathematical modeling, classification and conditions for the application of models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems
		GPC-8.2 Uses in practice mathematical models, methods and	Knows the basic mathematical models, methods and tools for designing and automating systems Knows how to choose

		tools for designing and automating systems	mathematical models, methods and tools for designing and automating systems Has the skills to apply mathematical models, methods and tools for designing and automating systems in practice
		GPC-8.3 Carries out modeling and design of information and automated systems	Knows the main approaches to modeling and designing information and automated systems Able to analyze and select approaches to modeling and designing information and automated systems Possesses the skills of modeling and designing information and automated systems

Discipline abstract

Modeling systems and technologies

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the obligatory part of the EP, studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

Mastering modern methods of modeling systems and methods of using the mathematical apparatus and PC to build and analyze models of different nature; study of typical mathematical schemes for modeling systems.

Tasks:

- to study the methods of formalizing the processes of functioning of systems;
- study the basics of statistical simulation;
- to study simulation tools;
- gain skills in building and researching models of real systems on a computer.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-1 Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities;	GPC-1.1 Defines the tools of mathematics, physics, computing and programming necessary for solving professional problems	Knows the basic tools of mathematics, physics, computing and programming necessary to solve professional problems Able to identify the tools of mathematics, physics, computing and programming necessary to solve professional problems Possesses the skills of a reasonable choice of tools of mathematics, physics, computer technology and programming necessary for solving professional problems
		GPC-1.2 Solves standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling	Knows methods for solving standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling Able to solve standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling Has the skills to apply natural science and general engineering knowledge, methods of mathematical analysis and

			modeling to solve standard professional problems
		GPC-1.3 Carries out theoretical and experimental research of objects of professional activity	Knows the methodology of theoretical and experimental research of objects of professional activity Able to apply methods of theoretical and experimental research of objects of professional activity Possesses the skills of theoretical and experimental research of objects of professional activity
	GPC-8 Able to apply mathematical models, methods and tools for designing information and automated systems.	GPC-8.1 Analyzes the methodology and basic methods of mathematical modeling, classification and conditions for the use of models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems	Knows the methodology and basic methods of mathematical modeling, classification and conditions for applying models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems Able to analyze the methodology and basic methods of mathematical modeling, classification and conditions for the use of models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems Possesses the skills of critical analysis of the methodology and basic methods of mathematical modeling, classification and conditions for the application of models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems
		GPC-8.2 Uses in practice mathematical models, methods and tools for designing and automating systems	Knows the basic mathematical models, methods and tools for designing and automating systems Knows how to choose mathematical models, methods and tools for designing and automating systems Has the skills to apply mathematical models, methods and tools for designing and automating systems in practice
		GPC-8.3 Carries out modeling and design of information and automated systems	Knows the main approaches to modeling and designing information and automated systems Able to analyze and select approaches to modeling and designing information and automated systems Possesses the skills of modeling

			and designing information and automated systems

Discipline abstract

Standards for the development of information systems and technologies

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the obligatory part of the EP, studied in the 3rd year and ends with a test. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours.

Implementation language: Russian.

Target:

To form in students an understanding of the main standards for the development of information systems, knowledge of the Russian regulatory framework for the development of information systems and technologies, as well as international standards.

Tasks:

- study of the main standards for the development of information systems;
- study of methods and techniques for standardizing the development of information technology;
- form and implement requirements for software development in accordance with the ESPD;
- apply standardization methods in solving problems and problems of science and production;
- navigate in reference scientific literature;
- to form the skills of using the ESPD and international standards in software development;
- develop skills and abilities to apply the ESPD and international standards in the development of ICT.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-4 Able to participate in the development of technical documentation related to professional activities using standards, norms and rules;	GPC-4.1 Complies with the basic standards for the design of technical documentation related to professional activities	Knows the main standards for the preparation of technical documentation related to professional activities Able to analyze the main standards for the design of technical documentation related to professional activities Has the skills to follow the main standards for the preparation of technical documentation related to professional activities
		GPC-4.2 Applies standards for the preparation of technical documentation at	Knows the standards for the preparation of technical documentation at various stages of the life cycle of an information system

		various stages of the life cycle of an information system	Able to correctly draw up technical documentation at various stages of the life cycle of an information system Has the skills to apply standards for the preparation of technical documentation at various stages of the life cycle of an information system
		GPC-4.3 Compiles technical documentation at various stages of the information system life cycle	Knows the basic rules and principles for compiling technical documentation at various stages of the life cycle of an information system Able to collect and analyze the information necessary for the preparation of technical documentation at various stages of the life cycle of an information system Skilled in compiling technical documentation at various stages of the life cycle of an information system
	GPC-7 Able to select platforms and software and hardware tools for the implementation of information systems;	GPC-7.1 Analyzes platforms, technologies and software and hardware tools for the implementation of information systems	Knows the main platforms, technologies and software and hardware tools for the implementation of information systems Is able to determine the key characteristics of platforms, technologies and software and hardware tools for the implementation of information systems Has the skills to analyze platforms, technologies and software and hardware tools for the implementation of information systems
		GPC-7.2 Selects platforms and software and hardware tools for the implementation of information systems	Knows a wide range of platforms and software and hardware tools for implementing information systems Able to critically compare platforms and software and hardware tools for the implementation of information systems Possesses the skills of a reasonable choice of platforms and instrumental software and hardware for the implementation of information systems
		GPC-7.3 Applies modern technologies for the implementation of information	Knows modern technologies for the implementation of information systems Knows how to justify the need to use modern technologies for the

		systems	implementation of information systems Has the skills to apply modern technologies for the implementation of information systems

Discipline abstract

Methods and tools for designing information systems and technologies

The total labor intensity of the discipline is 6 credits / 216 academic hours. It is a discipline of the obligatory part of the EP, studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 72 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 126 hours (including 45 hours for preparing for exams).

Implementation language: Russian.

Target:

Familiarization of students with the basics of theory and practice in the field of information systems design.

Tasks:

- mastering by students the basics of theoretical and practical knowledge in the field of information systems design;
- study of the main standards for the design of information systems;
- acquisition of skills and abilities in applying the methodology of functional modeling, methods for describing objects and processes using UML and other languages professionally used in the field of information systems design.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-4 Able to participate in the development of technical documentation related to professional activities using standards, norms and rules;	GPC-4.1 Complies with the basic standards for the design of technical documentation related to professional activities	Knows the main standards for the preparation of technical documentation related to professional activities Able to analyze the main standards for the design of technical documentation related to professional activities Has the skills to follow the main standards for the preparation of technical documentation related to professional activities
		GPC-4.2 Applies standards for the preparation of technical documentation at various stages of the life cycle of an information system	Knows the standards for the preparation of technical documentation at various stages of the life cycle of an information system Able to correctly draw up technical documentation at various stages of the life cycle of an information system Has the skills to apply standards for the preparation of technical documentation at various stages of the life cycle of an information system

		GPC-4.3 Compiles technical documentation at various stages of the information system life cycle	Knows the basic rules and principles for compiling technical documentation at various stages of the life cycle of an information system Able to collect and analyze the information necessary for the preparation of technical documentation at various stages of the life cycle of an information system Skilled in compiling technical documentation at various stages of the life cycle of an information system
	GPC-8 Able to apply mathematical models, methods and tools for designing information and automated systems.	GPC-8.1 Analyzes the methodology and basic methods of mathematical modeling, classification and conditions for the use of models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems	Knows the methodology and basic methods of mathematical modeling, classification and conditions for applying models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems Able to analyze the methodology and basic methods of mathematical modeling, classification and conditions for the use of models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems Possesses the skills of critical analysis of the methodology and basic methods of mathematical modeling, classification and conditions for the application of models, basic methods and tools for designing information and automated systems, tools for modeling and designing information and automated systems
		GPC-8.2 Uses in practice mathematical models, methods and tools for designing and automating systems	Knows the basic mathematical models, methods and tools for designing and automating systems Knows how to choose mathematical models, methods and tools for designing and automating systems Has the skills to apply mathematical models, methods and tools for designing and automating systems in practice
		GPC-8.3 Carries out modeling and design of information and automated systems	Knows the main approaches to modeling and designing information and automated systems Able to analyze and select approaches to modeling and designing information and

			automated systems Possesses the skills of modeling and designing information and automated systems

Discipline abstract

Physics

The total labor intensity of the discipline is 8 credits / 288 academic hours. It is a discipline of the obligatory part of the EP, studied in the 2nd year and ends with a test with an assessment. The curriculum provides for lectures in the amount of 70 hours, laboratory work in the amount of 86 hours, and hours are also allocated for independent work of the student - 132 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

– fundamental training in physics as a means of developing the natural-science thinking of a person capable of production, technological and design activities that ensure the modernization, implementation and operation of equipment in the field of informatics and computer technology;

– formation of skills for using the basic laws of physics in solving problems related to professional activities; the formation of a stable physical worldview among students, the ability to analyze and find methods for solving physical problems that arise in the field of informatics and computer technology.

Tasks:

- creation of the foundations of theoretical training in the field of physics, which allows one to navigate in the flow of scientific and technical information;
- formation of scientific thinking;
- mastering the basic physical phenomena and laws of classical and modern physics, methods of physical research;
- development of initial skills for conducting experimental studies using modern information technologies and assessing measurement errors;
- formation of a professional attitude towards research and applied work, development of creative initiative and independent thinking.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-1 Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities;	GPC-1.1 Defines the tools of mathematics, physics, computing and programming necessary for solving professional problems	Knows the basic tools of mathematics, physics, computing and programming necessary to solve professional problems Able to identify the tools of mathematics, physics, computing and programming necessary to solve professional problems Possesses the skills of a reasonable choice of tools of mathematics, physics, computer technology and programming necessary for solving professional problems
		GPC-1.2 Solves	Knows methods for solving standard

		standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling	professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling Able to solve standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling Has the skills to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling to solve standard professional problems
		GPC-1.3 Carries out theoretical and experimental research of objects of professional activity	Knows the methodology of theoretical and experimental research of objects of professional activity Able to apply methods of theoretical and experimental research of objects of professional activity Possesses the skills of theoretical and experimental research of objects of professional activity

Discipline abstract

Probability theory

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the obligatory part of the EP, studied in the 2nd year and ends with an exam. The curriculum provides for lectures in the amount of 32 hours, practical exercises in the amount of 34 hours, and hours are also allocated for independent work of the student - 78 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

To form in students an understanding of the basic laws of probability theory, with methods for applying probability theory to solving applied statistical problems, with basic probabilistic models, and to give an idea of the methods and algorithms for statistical processing of observational results.

Tasks:

- study the basics of probability theory, areas of application;
- to study the methods and techniques of the scientific apparatus of probability theory;
- master the practical skills of applying the methods of probability theory and mathematical statistics in solving problems and problems of science and production;
- to teach to navigate in reference scientific literature;
- to form the skills of acquiring new applied knowledge using modern methods of mathematical logic;
- develop the skills of using mathematical logic to form judgments on professional problems.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of general professional competencies	Code and name of general professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
	GPC-1 Able to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling, theoretical and experimental research in professional activities;	GPC-1.1 Defines the tools of mathematics, physics, computing and programming necessary for solving professional problems	Knows the basic tools of mathematics, physics, computing and programming necessary to solve professional problems Able to identify the tools of mathematics, physics, computing and programming necessary to solve professional problems Possesses the skills of a reasonable choice of tools of mathematics, physics, computer technology and programming necessary for solving professional problems
		GPC-1.2 Solves standard professional problems using natural science and general engineering	Knows methods for solving standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling

		knowledge, methods of mathematical analysis and modeling	Able to solve standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling Has the skills to apply natural science and general engineering knowledge, methods of mathematical analysis and modeling to solve standard professional problems
		GPC-1.3 Carries out theoretical and experimental research of objects of professional activity	Knows the methodology of theoretical and experimental research of objects of professional activity Able to apply methods of theoretical and experimental research of objects of professional activity Possesses the skills of theoretical and experimental research of objects of professional activity

Discipline abstract

Data collection and analysis project

The total labor intensity of the discipline is 6 credits / 216 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with a test with an assessment. The curriculum provides for laboratory work in the amount of 108 hours, and hours are also allocated for independent work of the student - 108 hours.

Implementation language: Russian.

Target:

To form the skills of project work among students, to master various approaches to collecting and analyzing data in practice.

Tasks:

- to study the basic principles of project management organization;
- to study the methods and techniques of data collection and analysis;
- form and implement the interaction of team members;
- apply methods of monitoring and maintaining the quality of work;
- navigate in reference scientific literature;
- to form the skills of data collection and analysis;
- develop skills and abilities in data collection and analysis.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to develop draft schedules and	Knows the principles of forming plans for conducting research in the field of information systems and

		programs for carrying out individual elements of research and development work	technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work
design	PC-2 Able to work in an international project team in the field of information systems and technologies, analyze, plan project work	PC-2.1 Analyzes methods and tools for designing information systems and technologies	Knows the basic methods of designing information systems and technologies Can identify and analyze design methods Proficient in analyzing methods and tools for designing information systems and technologies
		PC-2.2 Organizes the execution of projects in the field of information technology based on project plans	Knows the basic methods of organizing the execution of project work Able to organize the execution of projects in the field of information technology Has the skills to organize the execution of projects in the field of information technology
		PC-2.3 Monitors the implementation of projects in the field of information technology based on project plans	Knows the methods and means of monitoring the implementation of projects Able to estimate the time required to complete project milestones Has the skills to control the implementation of projects
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting,

			validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Information Systems and Networks Administration Project

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the part formed by the participants of educational relations, OP, is studied in the 4th year and ends with a test. The curriculum provides for laboratory work in the amount of 64 hours (including 32 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours.

Implementation language: Russian.

Target:

Studying the principles of information systems management by students, acquiring skills in the practical use of the theoretical provisions of the course.

Tasks:

- mastering the theory of administration of information systems, the principles of administration of systems and network services;
- development of skills in operations to install, configure and operate Windows, Linux; install configure and operate the Windows server and services: web, mail, routing, remote access, thin clients; perform troubleshooting; set up user accounts and profiles;
- mastering the skills of managing operating systems and user services.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
organizational and managerial	PC-3 Able to provide organizational support for the project in the field of information systems and technologies	PC-3.1 Organizes interaction with the customer and other stakeholders of the project	Knows the basic principles of organizing interaction with the customer Able to analyze information from the customer and other stakeholders of the project Has the skills to organize interaction with the customer and other stakeholders of the project
		PC-3.2 Organizes the conclusion of contracts, monitors the implementation of contracts in projects in the field of information systems and technologies	Knows the main stages of the organization of the contractual process Able to monitor the implementation of contracts Has the skills to conclude contracts and monitor their implementation
		PC-3.3 Manages the coordination and distribution of documentation in accordance with established regulations	Knows the basic principles of document management Able to ensure the coordination and distribution of documentation Has the skills to manage the approval and distribution of documentation in accordance with established regulations
production	PC-6 Capable of	PC-6.1 Able to analyze	Knows the architecture, device and

and technologic al	analyzing, developing and applying network technologies based on physical and logical layer protocols	the use and quality of use of network technologies	basic principles of network technologies Able to analyze the use and quality of use of network technologies Has the skills to analyze the use and quality of use of network technologies
		PC-6.2 Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems	Knows the possibilities of typical schemes for backup, archiving and recovery of information and communication and server systems Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems Proficient in the use of schemes for backup, archiving and recovery of information and communication and server systems
		PC-6.3 Capable of identifying and eliminating incidents in information and communication and server systems	Knows the tools and methods for identifying incidents in information and communication and server systems Able to identify incidents in information and communication and server systems Has the skills to eliminate incidents in information and communication and server systems

Discipline abstract

Project activities of distributed teams

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the part formed by the participants of educational relations, OP, is studied in the 4th year and ends with a test. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 16 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours.

Implementation language: Russian.

Target:

To develop the skills of students to work in distributed project teams.

Tasks:

- studying the basic principles of organizing the management of distributed teams;
- study of methods and techniques of effective communication in a distributed team;
- form and implement the interaction of team members;
- apply methods of monitoring and maintaining the quality of work;
- navigate in reference scientific literature;
- to form the skills of establishing personal connections in the team;
- develop skills and abilities to work in a distributed team.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Name of the category (group) of universal competencies	Code and name of the universal competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
Teamwork and Leadership	UK-3 Able to carry out social interaction and realize his role in the team	UK-3.1 Uses cooperative strategies to achieve the set goal, defines his role in the team	Knows existing cooperation strategies when organizing teamwork Able to determine his role in the team in solving tasks Possesses team building skills
		UK-3.2 Takes initiative when working in a team	Able to initiate problem solving when working in a team Possesses entrepreneurial skills, including when working in a team

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
design	PC-2 Able to work in an international project team in the field of	PC-2.1 Analyzes methods and tools for designing information systems and	Knows the basic methods of designing information systems and technologies

	information systems and technologies, analyze, plan project work	technologies	Can identify and analyze design methods Proficient in analyzing methods and tools for designing information systems and technologies
		PC-2.2 Organizes the execution of projects in the field of information technology based on project plans	Knows the basic methods of organizing the execution of project work Able to organize the execution of projects in the field of information technology Has the skills to organize the execution of projects in the field of information technology
		PC-2.3 Monitors the implementation of projects in the field of information technology based on project plans	Knows the methods and means of monitoring the implementation of projects Able to estimate the time required to complete project milestones Has the skills to control the implementation of projects
organizational and managerial	PC-3 Able to provide organizational support for the project in the field of information systems and technologies	PC-3.1 Organizes interaction with the customer and other stakeholders of the project	Knows the basic principles of organizing interaction with the customer Able to analyze information from the customer and other stakeholders of the project Has the skills to organize interaction with the customer and other stakeholders of the project
		PC-3.2 Organizes the conclusion of contracts, monitors the implementation of contracts in projects in the field of information systems and technologies	Knows the main stages of the organization of the contractual process Able to monitor the implementation of contracts Has the skills to conclude contracts and monitor their implementation
		PC-3.3 Manages the coordination and distribution of documentation in accordance with established regulations	Knows the basic principles of document management Able to ensure the coordination and distribution of documentation Has the skills to manage the approval and distribution of documentation in accordance with established regulations

Discipline abstract

Computational methods of computer systems

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the part formed by the participants of educational relations, OP, is studied in the 2nd year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 32 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

Mastering theoretical knowledge in the field of computational methods and acquiring practical skills in their application based on computer systems.

Tasks:

- obtaining fundamental knowledge in the field of computational methods;
- study of basic computational methods for solving various classes of mathematical problems;
- development of the ability to implement computational methods based on computer systems;
- development of readiness to apply computational methods for solving applied problems in the professional field.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to develop draft	Knows the principles of forming plans for conducting research in the

		schedules and programs for carrying out individual elements of research and development work	field of information systems and technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Statistical methods in information systems

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 32 hours, practical classes in the amount of 64 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 48 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

Formation of basic concepts and methods of probability theory and mathematical statistics among students, preparation of students for the study of related applied and special courses using statistical methods and probabilistic models of systems and processes.

Tasks:

- study of the basic concepts and methods of probability theory and mathematical statistics;
- master the skills of solving applied problems using statistical methods;
- master the skills of computer simulation of random events and random variables;
- studying the basics of building and analyzing stochastic models of information systems.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to develop draft schedules and	Knows the principles of forming plans for conducting research in the field of information systems and

		programs for carrying out individual elements of research and development work	technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Fundamentals of data management

The total labor intensity of the discipline is 3 credits / 108 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 44 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

Mastering database (DB) design methodology, characteristics of modern database management systems (DBMS), language tools, modern database organization technologies, acquiring skills in working in a DBMS environment.

Tasks:

- mastering the theoretical provisions of the database design methodology;
- practical mastering of modern technologies of database organization;
- acquisition of skills of work in the DBMS environment.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces
production and	PC-5 Capable of testing, preparing and	PC-5.1 Understands the software testing	Knows the basic methods of software testing

technologic al	applying test datasets	process and software product life cycle	Can analyze software testing process Has the skills to analyze the software testing process and the life cycle of a software product
		PC-5.2 Able to use special software for automated testing	Knows the main types of special software for automated testing Able to configure special software for automated testing Proficient in using special software for automated testing
		PC-5.3 Able to compare and analyze, independently find the information necessary to restore systems after a failure	Knows the general principles of system recovery after a failure Able to compare and analyze, independently find the information necessary to restore systems after a failure Has the skills to analyze and search for information necessary to restore systems after a failure
production and technologic al	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technologic al	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big

			data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Information and coding theory

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, practical classes in the amount of 36 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 90 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

Students study the principles of measuring, processing, compressing, encoding information, determining the bandwidth of communication channels with and without interference.

Tasks:

- study of the main provisions of information theory for discrete events;
- study of the main provisions of information theory for continuous events;
- study of communication channels and their characteristics;
- study of coding methods and characteristics of codes;
- application in practice of the received theoretical knowledge.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to develop draft schedules and programs for carrying out individual	Knows the principles of forming plans for conducting research in the field of information systems and technologies Able to develop research programs in

		elements of research and development work	the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work

Discipline abstract

Administration of information systems and networks

The total labor intensity of the discipline is 8 credits / 288 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with an exam, a test. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 108 hours (including 54 hours in an interactive form), and hours are also allocated for independent work of the student - 162 hours (including 45 hours for preparing for exams).

Implementation language: Russian.

Target:

Studying the principles of information systems management by students, acquiring skills in the practical use of the theoretical provisions of the course.

Tasks:

- mastering the theory of administration of information systems, principles of administration of operating systems and network services;
- development of skills in operations to install, configure and operate Windows, Linux; install configure and operate the Windows server and services: web, mail, routing, remote access, thin clients; perform troubleshooting; set up user accounts and profiles;
- mastering the skills of managing operating systems and user services.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols	PC-6.1 Able to analyze the use and quality of use of network technologies	Knows the architecture, device and basic principles of network technologies Able to analyze the use and quality of use of network technologies Has the skills to analyze the use and quality of use of network technologies
		PC-6.2 Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems	Knows the possibilities of typical schemes for backup, archiving and recovery of information and communication and server systems Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems Proficient in the use of schemes for backup, archiving and recovery of information and communication and server systems
		PC-6.3 Capable of identifying and eliminating incidents in information and communication and	Knows the tools and methods for identifying incidents in information and communication and server systems Able to identify incidents in

		server systems	information and communication and server systems Has the skills to eliminate incidents in information and communication and server systems

Discipline abstract

Artificial intelligence methods

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the part formed by the participants of educational relations, OP, is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

Mastering modern methods for the development and application of intelligent systems, acquiring skills in the conceptual design of intelligent systems.

Tasks:

- consideration of the main methods of research of artificial intelligence systems;
- development of abilities and skills of modeling and analysis of various types of intelligent systems;
- formation of the ability to use artificial intelligence methods to solve applied problems in various subject areas.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Data analysis and machine learning

The total labor intensity of the discipline is 5 credits / 180 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 90 hours (including 64 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

Formation of students' theoretical knowledge and practical skills in the field of data analysis and machine learning, students' mastery of tools, models and methods of machine learning, acquisition of data researcher skills.

Tasks:

- study of modern methods of data mining;
- study of the main methods and models for working with data;
- acquisition of skills in data processing, selection and analysis of quality parameters for a specific task, verification and evaluation of the model;
- the formation of practical skills in the application of data analysis algorithms and machine learning;
- development of software development skills using the capabilities of modern libraries for data analysis and machine learning;
- development of debugging and software testing skills.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops	Knows the tools and techniques for

		integrated software, interaction interfaces	developing integrated software Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces
production and technologic al	PC-5 Capable of testing, preparing and applying test datasets	PC-5.1 Understands the software testing process and software product life cycle	Knows the basic methods of software testing Can analyze software testing process Has the skills to analyze the software testing process and the life cycle of a software product
		PC-5.2 Able to use special software for automated testing	Knows the main types of special software for automated testing Able to configure special software for automated testing Proficient in using special software for automated testing
		PC-5.3 Able to compare and analyze, independently find the information necessary to restore systems after a failure	Knows the general principles of system recovery after a failure Able to compare and analyze, independently find the information necessary to restore systems after a failure Has the skills to analyze and search for information necessary to restore systems after a failure
production and technologic al	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technologic al	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data

			analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Algorithms and data structures

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities that ensure the construction of effective algorithms and programs in relation to tasks with complex data organization.

Tasks:

- study of the theory of data structures, methods of data representation at the logical (abstract) and physical (machine) levels;
- mastering effective algorithms for processing various data structures, comparative analysis and evaluation of the effectiveness of selected algorithms in solving specific problems;
- obtaining practical skills in solving problems using various data structures;
- formation of skills and abilities to develop algorithms for solving problems with complex data organization;
- formation of skills in the development of effective algorithms for sorting, searching, encoding, compressing and encrypting information.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software,	Knows the tools and techniques for developing integrated software

		interaction interfaces	Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

big data

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 4th year and ends with an exam, a test. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 64 hours (including 48 hours in an interactive form), and hours are also allocated for independent work of the student - 64 hours (including 54 hours for preparing for exams).

Implementation language: Russian.

Target:

Obtaining theoretical knowledge and practical skills necessary when working with big data (Big Data), collecting and analyzing huge amounts of structured or unstructured information, developing data models and gaining new knowledge.

Tasks:

- acquisition by students of knowledge about the technologies for preparing, storing, processing and analyzing big data;
- gaining skills in applying statistical and mathematical methods to analyze large amounts of information;
- mastering modern ideas about the principles of building big data processing systems and information systems based on them, their structure and the basics of hardware and software.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technologic	PC-8Able to conduct analytical research using big data	PC-8.1 Identifies big data sources for analysis, extracts,	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and

al	technologies	validates and cleans data	transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

High Performance Computing

The total labor intensity of the discipline is 2 credit units / 72 academic hours. It is a discipline of the choice of the OP, studied in the 3rd year and ends with a test. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 40 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 16 hours.

Implementation language: Russian.

Target:

Mastering the methodology of parallel programming and design methods based on high-performance software and hardware.

Tasks:

- mastering the theoretical provisions for the development of parallel computer programs;
- study of methods of parallel design of multi-threaded computer programs;
- practical development of methods of parallel design and programming.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Assembly languages

The total labor intensity of the discipline is 2 credit units / 72 academic hours. It is a discipline of the choice of the OP, studied in the 3rd year and ends with a test. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 40 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 16 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of programming in assembly languages.

Tasks:

- give a general idea of the subject area of programming in assembly languages;
- identify the problems that arise in the development and operation of programs in assembly languages;
- to study the basic principles of developing programs in assembly languages;
- consideration of various approaches to the development of programs in assembly languages;
- studying the basics of programming technology in assembly languages;
- master the methodology of programming in assembly languages;
- to form programming skills in assembly languages;
- develop skills and abilities of programming in assembly languages.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops	Knows the tools and techniques for

		integrated software, interaction interfaces	developing integrated software Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

GPU Computing

The total labor intensity of the discipline is 2 credit units / 72 academic hours. It is a discipline of the choice of the OP, studied in the 3rd year and ends with a test. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 40 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 16 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of computing on graphics processors.

Tasks:

- give a general idea of the subject area of computing on graphics processors;
- identify the problems that arise in the development and operation of programs for computing on graphic processors;
- study the basic principles of developing programs for computing on graphic processors;
- consideration of different development approaches for GPU computing;
- studying the basics of programming technology for graphics processors;
- master the methodology of programming on GPUs;
- to form programming skills on graphic processors;
- develop skills and abilities of programming on graphic processors.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops	Knows the tools and techniques for

		integrated software, interaction interfaces	developing integrated software Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Preliminary preparation and data processing

The total labor intensity of the discipline is 2 credit units / 72 academic hours. It is a discipline of the choice of the OP, studied in the 3rd year and ends with a test. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 40 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 16 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of preliminary data preparation and processing.

Tasks:

- give a general idea of the subject area of preliminary data preparation and processing;
- identify problems that arise in the preliminary preparation and processing of data;
- study the basic principles of preliminary preparation and processing of data;
- consider different approaches to preliminary preparation and processing of data;
- to study the basics of technology for preliminary preparation and data processing;
- master the methodology of preliminary preparation and data processing;
- to form the skills of preliminary preparation and data processing;
- develop skills and abilities of preliminary preparation and data processing.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software,	Knows the tools and techniques for developing integrated software

		interaction interfaces	Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Web technologies

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of Web technologies.

Tasks:

- give a general idea of the subject area of Web-technologies;
- identify problems that arise when using Web technologies;
- study the basic principles of Web-technologies;
- consider different approaches to the use of Web-technologies;
- learn the basics of Web technologies;
- master the methodology of Web-technologies;
- to form the skills of using Web-technologies;
- develop skills and abilities in the use of Web-technologies.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated

			software, interaction interfaces Has the skills to develop integrated software, interaction interfaces
production and technologic al	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results

Discipline abstract

Microprocessors

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of microprocessors.

Tasks:

- give a general idea of the subject area of microprocessors;
- identify the problems that arise in the development and operation of microprocessors;
- to study the basic principles of development and operation of microprocessors;
- consideration of various approaches to the development of microprocessors;
- studying the basics of microprocessor programming technology;
- to master the methodology of programming microprocessors;
- to form the skills of programming microprocessors;
- develop skills and abilities of microprocessor programming.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated

			software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Fundamentals of web programming and design

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of web programming and design.

Tasks:

- give a general idea of the subject area of web programming and design;
- identify problems that arise in the field of web programming and design;
- learn the basic principles of web programming and design;
- consider different approaches to web programming and design;
- learn the basics of web programming and design technology;
- master the methodology of web programming and design;
- to form skills in the field of web-programming and design;
- develop skills and abilities in the field of web-programming and design.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated

			software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Cyber-Physical Systems

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of cyber-physical systems.

Tasks:

- give a general idea of the subject area of cyber-physical systems;
- identify the problems that arise in the development and operation of cyber-physical systems;
- to study the basic principles of development and operation of cyber-physical systems;
- consideration of various approaches to the development of cyber-physical systems;
- studying the basics of programming technology for cyber-physical systems;
- master the methodology of programming cyber-physical systems;
- to form the skills of programming cyber-physical systems;
- develop skills and abilities of programming cyber-physical systems.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops	Knows the tools and techniques for

		integrated software, interaction interfaces	developing integrated software Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Data visualization

The total labor intensity of the discipline is 3 credits / 108 academic hours. It is a discipline of the choice of the OP, studied in the 4th year and ends with a test. The curriculum provides for lectures in the amount of 16 hours (including 16 hours in an interactive form), laboratory work in the amount of 34 hours, and hours are also allocated for independent work of the student - 58 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of data visualization.

Tasks:

- give a general idea of the subject area of data visualization;
- identify problems that arise in data visualization;
- learn the basic principles of data visualization;
- consider different approaches to data visualization;
- learn the basics of data visualization technology;
- master the methodology of data visualization;
- develop data visualization skills;
- develop data visualization skills and abilities.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to develop draft	Knows the principles of forming plans for conducting research in the

		schedules and programs for carrying out individual elements of research and development work	field of information systems and technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

3D Solid Modeling Technologies

The total labor intensity of the discipline is 3 credits / 108 academic hours. It is a discipline of the choice of the OP, studied in the 4th year and ends with a test. The curriculum provides for lectures in the amount of 16 hours (including 16 hours in an interactive form), laboratory work in the amount of 34 hours, and hours are also allocated for independent work of the student - 58 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of 3D solid modeling technologies.

Tasks:

- give a general idea of the subject area of three-dimensional solid modeling;
- identify the problems that arise in 3D solid modeling;
- to study the basic principles of three-dimensional solid modeling;
- consideration of various approaches to 3D solid modeling;
- studying the basics of 3D solid modeling technology;
- master the methodology of three-dimensional solid modeling;
- to form the skills of three-dimensional solid modeling;
- develop the skills and abilities of three-dimensional solid modeling.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods

		PC-1.3 Able to develop draft schedules and programs for carrying out individual elements of research and development work	Knows the principles of forming plans for conducting research in the field of information systems and technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work

Discipline abstract

Image processing

The total labor intensity of the discipline is 3 credits / 108 academic hours. It is a discipline of the choice of the OP, studied in the 4th year and ends with a test. The curriculum provides for lectures in the amount of 16 hours (including 16 hours in an interactive form), laboratory work in the amount of 34 hours, and hours are also allocated for independent work of the student - 58 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of image processing.

Tasks:

- give a general idea of the subject area of image processing;
- identify problems that arise in image processing;
- study the basic principles of image processing;
- consider different approaches to image processing;
- learn the basics of image processing technology;
- master the methodology of image processing;
- develop image processing skills;
- develop skills and abilities in image processing.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to develop draft	Knows the principles of forming plans for conducting research in the

		schedules and programs for carrying out individual elements of research and development work	field of information systems and technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work
production and technologic al	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results

Discipline abstract

Fundamentals of 3D modeling, numerical control and printing

The total labor intensity of the discipline is 3 credits / 108 academic hours. It is a discipline of the choice of the OP, studied in the 4th year and ends with a test. The curriculum provides for lectures in the amount of 16 hours (including 16 hours in an interactive form), laboratory work in the amount of 34 hours, and hours are also allocated for independent work of the student - 58 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of 3D modeling, numerical control and printing.

Tasks:

- give a general idea of the subject area of 3D modeling, numerical control and printing;
- identify problems that arise in 3D modeling, numerical control and printing;
- learn the basic principles of 3D modeling, numerical control and printing;
- consideration of various approaches to 3D modeling, numerical control and printing;
- learning the basics of 3D modeling, numerical control and printing;
- master the methodology of 3D modeling, numerical control and printing;
- to form the skills of 3D modeling, numerical control and printing;
- develop the skills and abilities of 3D modeling, numerical control and printing.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to	Knows the principles of forming

		develop draft schedules and programs for carrying out individual elements of research and development work	plans for conducting research in the field of information systems and technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work

Discipline abstract

Cloud and hybrid technologies and services

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of cloud and hybrid technologies and services.

Tasks:

- give a general idea of the subject area of cloud and hybrid technologies and services;
- identify problems that arise when using cloud and hybrid technologies and services;
- study the basic principles of organizing cloud and hybrid technologies and services;
- consider various approaches to the use of cloud and hybrid technologies and services;
- learn the basics of cloud and hybrid technologies and services;
- master the methodology of cloud and hybrid technologies and services;
- to form skills in the use of cloud and hybrid technologies and services;
- develop skills and abilities in the use of cloud and hybrid technologies and services.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols	PC-6.1 Able to analyze the use and quality of use of network technologies	Knows the architecture, device and basic principles of network technologies Able to analyze the use and quality of use of network technologies Has the skills to analyze the use and quality of use of network technologies
		PC-6.2 Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems	Knows the possibilities of typical schemes for backup, archiving and recovery of information and communication and server systems Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems Proficient in the use of schemes for backup, archiving and recovery of information and communication and server systems
		PC-6.3 Capable of identifying and	Knows the tools and methods for identifying incidents in information

		eliminating incidents in information and communication and server systems	and communication and server systems Able to identify incidents in information and communication and server systems Has the skills to eliminate incidents in information and communication and server systems
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Information processing technologies on microcontrollers

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of information processing technologies on microcontrollers.

Tasks:

- give a general idea of the subject area of information processing on microcontrollers;
- identify the problems that arise when processing information on microcontrollers;
- to study the basic principles of information processing on microcontrollers;
- consideration of various approaches to information processing on microcontrollers;
- studying the basics of information processing on microcontrollers;
- master the methodology of information processing on microcontrollers;
- to form information processing skills on microcontrollers;
- develop skills and abilities in processing information on microcontrollers.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated

			software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Robot Programming Ecosystems

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of work in robot programming ecosystems.

Tasks:

- give a general idea of the subject area of robot programming ecosystems;
- identify problems that arise in the operation of robot programming ecosystems;
- study the basic principles of working in robot programming ecosystems;
- consideration of various robot programming ecosystems;
- learning the basics of working in robot programming ecosystems using the example of the operating system for robots (ROS);
- master the methodology of programming robots;
- to form the skills of developing programs in ROS;
- develop skills and abilities in developing programs for ROS.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated software, interaction interfaces

			Has the skills to develop integrated software, interaction interfaces
production and technological	PC-5 Capable of testing, preparing and applying test datasets	PC-5.1 Understands the software testing process and software product life cycle	Knows the basic methods of software testing Can analyze software testing process Has the skills to analyze the software testing process and the life cycle of a software product
		PC-5.2 Able to use special software for automated testing	Knows the main types of special software for automated testing Able to configure special software for automated testing Proficient in using special software for automated testing
		PC-5.3 Able to compare and analyze, independently find the information necessary to restore systems after a failure	Knows the general principles of system recovery after a failure Able to compare and analyze, independently find the information necessary to restore systems after a failure Has the skills to analyze and search for information necessary to restore systems after a failure

Discipline abstract

Blockchain and its applications

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of blockchain and its applications.

Tasks:

- give a general idea of the blockchain subject area;
- identify the problems that arise when using the blockchain;
- learn the basic principles of blockchain;
- consider different approaches to the use of the blockchain and its applications;
- learn the basics of blockchain organization;
- master the blockchain methodology;
- to form skills in using the blockchain and its applications;
- develop skills and abilities in the use of blockchain and its applications.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols	PC-6.1 Able to analyze the use and quality of use of network technologies	Knows the architecture, device and basic principles of network technologies Able to analyze the use and quality of use of network technologies Has the skills to analyze the use and quality of use of network technologies
		PC-6.2 Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems	Knows the possibilities of typical schemes for backup, archiving and recovery of information and communication and server systems Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems Proficient in the use of schemes for backup, archiving and recovery of information and communication and server systems
		PC-6.3 Capable of identifying and eliminating incidents	Knows the tools and methods for identifying incidents in information and communication and server

		in information and communication and server systems	systems Able to identify incidents in information and communication and server systems Has the skills to eliminate incidents in information and communication and server systems
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Digital footprint data preprocessing

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of digital footprint data preprocessing.

Tasks:

- give a general idea of the subject area of digital footprint data preprocessing;
- identify the problems that arise in the process of preprocessing digital footprint data;
- study the basic principles of organizing the preprocessing of digital footprint data;
- consider different approaches to preprocessing digital footprint data;
- study the basics of digital footprint data preprocessing technology;
- master the methodology of digital footprint data preprocessing;
- to form the skills of digital footprint data preprocessing;
- develop the skills and abilities of digital footprint data preprocessing.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated

			software, interaction interfaces Has the skills to develop integrated software, interaction interfaces
production and technological	PC-5 Capable of testing, preparing and applying test datasets	PC-5.1 Understands the software testing process and software product life cycle	Knows the basic methods of software testing Can analyze software testing process Has the skills to analyze the software testing process and the life cycle of a software product
		PC-5.2 Able to use special software for automated testing	Knows the main types of special software for automated testing Able to configure special software for automated testing Proficient in using special software for automated testing
		PC-5.3 Able to compare and analyze, independently find the information necessary to restore systems after a failure	Knows the general principles of system recovery after a failure Able to compare and analyze, independently find the information necessary to restore systems after a failure Has the skills to analyze and search for information necessary to restore systems after a failure
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results

Discipline abstract

Distributed networks of microcontrollers and sensors

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of programming sensors and actuators.

Tasks:

- give a general idea of the subject area of programming sensors and actuators;
- identify problems that arise when programming sensors and actuators;
- to study the basic principles of programming sensors and actuators;
- consideration of methods for programming sensors and actuators;
- studying the basics of programming sensors and actuators;
- master the methodology of programming sensors and actuators;
- to form skills in developing programs for sensors and actuators;
- develop skills and abilities in developing programs for sensors and actuators.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols	PC-6.1 Able to analyze the use and quality of use of network technologies	Knows the architecture, device and basic principles of network technologies Able to analyze the use and quality of use of network technologies Has the skills to analyze the use and quality of use of network technologies
		PC-6.2 Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems	Knows the possibilities of typical schemes for backup, archiving and recovery of information and communication and server systems Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems Proficient in the use of schemes for backup, archiving and recovery of information and communication and server systems
		PC-6.3 Capable of identifying and eliminating incidents	Knows the tools and methods for identifying incidents in information and communication and server

		in information and communication and server systems	systems Able to identify incidents in information and communication and server systems Has the skills to eliminate incidents in information and communication and server systems

Discipline abstract

Digital Footprint Data Collection Protocols

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of digital footprint data collection.

Tasks:

- provide an overview of digital footprint data collection protocols;
- identify issues that arise in the process of collecting digital footprint data;
- study the basic principles of organizing the collection of digital footprint data;
- consider different approaches to collecting digital footprint data;
- learn the basics of digital footprint data collection protocols;
- master the methodology for collecting digital footprint data;
- build skills in collecting digital footprint data;
- develop skills and abilities in the application of digital footprint data collection protocols.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols	PC-6.1 Able to analyze the use and quality of use of network technologies	Knows the architecture, device and basic principles of network technologies Able to analyze the use and quality of use of network technologies Has the skills to analyze the use and quality of use of network technologies
		PC-6.2 Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems	Knows the possibilities of typical schemes for backup, archiving and recovery of information and communication and server systems Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems Proficient in the use of schemes for backup, archiving and recovery of information and communication and server systems
		PC-6.3 Capable of identifying and	Knows the tools and methods for identifying incidents in information

		eliminating incidents in information and communication and server systems	and communication and server systems Able to identify incidents in information and communication and server systems Has the skills to eliminate incidents in information and communication and server systems
production and technologic al	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results

Discipline abstract

Programming sensors and actuators

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 16 hours, laboratory work in the amount of 48 hours (including 24 hours in an interactive form), and hours are also allocated for independent work of the student - 80 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of programming sensors and actuators.

Tasks:

- give a general idea of the subject area of programming sensors and actuators;
- identify problems that arise when programming sensors and actuators;
- to study the basic principles of programming sensors and actuators;
- consideration of methods for programming sensors and actuators;
- studying the basics of programming sensors and actuators;
- master the methodology of programming sensors and actuators;
- to form skills in developing programs for sensors and actuators;
- develop skills and abilities in developing programs for sensors and actuators.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated

			software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Neural networks and deep learning

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of neural networks and deep learning.

Tasks:

- give a general idea of the subject area of neural networks and deep learning;
- identify problems that arise when using neural networks;
- to study the basic principles of the organization of neural networks;
- consider various approaches to the creation and application of neural networks and deep learning;
- learn the basics of neural network technology and deep learning;
- master the methodology of programming neural networks and deep learning;
- to form the skills of programming neural networks and deep learning;
- develop skills and abilities in the use of neural networks and deep learning.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to	Knows the principles of forming

		develop draft schedules and programs for carrying out individual elements of research and development work	plans for conducting research in the field of information systems and technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital

			footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Methods and tools for testing information systems and software

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of testing information systems and software.

Tasks:

- give a general idea of the subject area of testing information systems and software;
- identify problems that arise when testing information systems and software;
- to study the basic principles of organizing testing of information systems and software;
- consider different approaches to testing information systems and software;
- to study the basics of testing technology for information systems and software;
- master the methodology of testing information systems and software;
- to form the skills of testing information systems and software;
- develop the skills and abilities of testing information systems and software.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-5 Capable of testing, preparing and applying test datasets	PC-5.1 Understands the software testing process and software product life cycle	Knows the basic methods of software testing Can analyze software testing process Has the skills to analyze the software testing process and the life cycle of a software product
		PC-5.2 Able to use special software for automated testing	Knows the main types of special software for automated testing Able to configure special software for automated testing Proficient in using special software for automated testing
		PC-5.3 Able to compare and analyze, independently find the information necessary to restore systems after a failure	Knows the general principles of system recovery after a failure Able to compare and analyze, independently find the information necessary to restore systems after a failure Has the skills to analyze and search for information necessary to restore systems after a failure

Discipline abstract

Simulation of physical processes

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of modeling physical processes.

Tasks:

- give a general idea of the subject area of modeling physical processes;
- identify the problems that arise in the modeling of physical processes;
- study the basic principles of modeling physical processes;
- consideration of methods for modeling physical processes;
- study of the physical foundations of modeling;
- master the methodology of modeling physical processes;
- to form the skills of developing models of physical processes;
- develop skills and abilities in the development of models of physical processes.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to develop draft	Knows the principles of forming plans for conducting research in the

		schedules and programs for carrying out individual elements of research and development work	field of information systems and technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work

Discipline abstract

Fundamentals of computer materials science

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 27 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of computer materials science.

Tasks:

- give a general idea of the subject area of computer materials science;
- identify the problems that arise in the modeling of materials;
- study the basic principles of computer materials science;
- consideration of methods for modeling materials;
- study of the physical foundations of computer materials science;
- master the methodology of computer materials science;
- to form the skills of developing models of the structure of materials;
- develop skills and abilities in the development of models of atomic structure.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to develop draft	Knows the principles of forming plans for conducting research in the

		schedules and programs for carrying out individual elements of research and development work	field of information systems and technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work

Discipline abstract

Semantic analysis methods

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the choice of the OP, studied in the 4th year and ends with a test. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 36 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 90 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of semantic analysis.

Tasks:

- give a general idea of the subject area of semantic analysis;
- identify the problems that arise in semantic analysis;
- study the basic principles of semantic analysis;
- consider different approaches to semantic analysis;
- study the basics of semantic analysis technology;
- master the methodology of semantic analysis;
- to form the skills of semantic analysis;
- develop the skills and abilities of semantic analysis.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated

			software, interaction interfaces Has the skills to develop integrated software, interaction interfaces
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

machine vision

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the choice of the OP, studied in the 4th year and ends with a test. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 36 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 90 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of machine vision.

Tasks:

- give a general idea of machine vision systems;
- identify the problems that arise with software that includes elements of machine vision;
- to study the basic principles and areas of application, the classification of machine vision;
- consideration of ways to develop software for machine vision systems;
- master the methodology for developing software for machine vision systems;
- to form the skills of designing machine vision systems;
- develop skills and abilities in the operation and maintenance of machine vision systems.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and development in the field of information systems and technologies	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods

		PC-1.3 Able to develop draft schedules and programs for carrying out individual elements of research and development work	Knows the principles of forming plans for conducting research in the field of information systems and technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work

Discipline abstract

natural language processing

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the choice of the OP, studied in the 4th year and ends with a test. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 36 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 90 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of natural language processing.

Tasks:

- give a general idea of the subject area of natural language processing;
- identify problems that arise in natural language processing;
- learn the basic principles of natural language processing;
- consider different approaches to natural language processing;
- learn the basics of natural language processing technology;
- master the methodology of natural language processing;
- to form natural language processing skills;
- develop natural language processing skills and abilities.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated

			software, interaction interfaces Has the skills to develop integrated software, interaction interfaces
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Real time systems

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the choice of the OP, studied in the 4th year and ends with a test. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 36 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 90 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the use of real-time systems.

Tasks:

- give a general idea of real-time systems;
- identify the problems that arise in the selection and application of real-time systems;
- study the basic principles and areas of application, the classification of RTS;
- consideration of ways to develop software for real-time systems;
- to master the methodology of software development for RTS systems;
- to form the skills of deploying real-time systems;
- develop skills and abilities in the operation and maintenance of real-time systems.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols	PC-6.1 Able to analyze the use and quality of use of network technologies	Knows the architecture, device and basic principles of network technologies Able to analyze the use and quality of use of network technologies Has the skills to analyze the use and quality of use of network technologies
		PC-6.2 Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems	Knows the possibilities of typical schemes for backup, archiving and recovery of information and communication and server systems Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems Proficient in the use of schemes for backup, archiving and recovery of information and communication and server systems
		PC-6.3 Capable of identifying and eliminating incidents in information and communication and	Knows the tools and methods for identifying incidents in information and communication and server systems Able to identify incidents in

		server systems	information and communication and server systems Has the skills to eliminate incidents in information and communication and server systems

Discipline abstract

Heterogeneous databases and storages

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 36 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 90 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of heterogeneous databases and repositories.

Tasks:

- give a general idea of the subject area of heterogeneous databases and storages;
- identify problems that arise when using heterogeneous databases and storages;
- study the basic principles of organizing heterogeneous databases and storages;
- consider various approaches to organizing heterogeneous databases and storages;
- to study the basics of technology for organizing heterogeneous databases and storages;
- master the methodology of working with heterogeneous databases and storages;
- to form skills in working with heterogeneous databases and storages;
- develop skills and abilities to work with heterogeneous databases and repositories.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols	PC-6.1 Able to analyze the use and quality of use of network technologies	Knows the architecture, device and basic principles of network technologies Able to analyze the use and quality of use of network technologies Has the skills to analyze the use and quality of use of network technologies
		PC-6.2 Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems	Knows the possibilities of typical schemes for backup, archiving and recovery of information and communication and server systems Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems Proficient in the use of schemes for backup, archiving and recovery of information and communication and server systems
		PC-6.3 Capable of identifying and	Knows the tools and methods for identifying incidents in information

		eliminating incidents in information and communication and server systems	and communication and server systems Able to identify incidents in information and communication and server systems Has the skills to eliminate incidents in information and communication and server systems
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Data lakes and distributed file systems

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 36 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 90 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of data lakes and distributed file systems.

Tasks:

- give a general idea of the subject area of data lakes and distributed file systems;
- identify problems that arise when using data lakes and distributed file systems;
- study the basic principles of organizing data lakes and distributed file systems;
- consider different approaches to organizing data lakes and distributed file systems;
- study the basics of technology for organizing data lakes and distributed file systems;
- master the methodology of working with data lakes and distributed file systems;
- to form skills in working with data lakes and distributed file systems;
- develop skills and abilities to work with data lakes and distributed file systems.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols	PC-6.1 Able to analyze the use and quality of use of network technologies	Knows the architecture, device and basic principles of network technologies Able to analyze the use and quality of use of network technologies Has the skills to analyze the use and quality of use of network technologies
		PC-6.2 Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems	Knows the possibilities of typical schemes for backup, archiving and recovery of information and communication and server systems Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems Proficient in the use of schemes for backup, archiving and recovery of information and communication and server systems
		PC-6.3 Capable of identifying and eliminating incidents	Knows the tools and methods for identifying incidents in information and communication and server

		in information and communication and server systems	systems Able to identify incidents in information and communication and server systems Has the skills to eliminate incidents in information and communication and server systems
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Fundamentals of VR/AR system development

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 36 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 90 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of developing VR / AR systems.

Tasks:

- give a general idea of the general structure of common VR / AR systems;
- identify the problems that arise in the development of software for VR / AR systems;
- study the basic principles and stages of the life cycle of the development of information systems and components for VR / AR systems;
- consideration of ways to develop software for VR/AR systems;
- master the methodology of software development for VR/AR systems;
- to form software development skills for VR/AR systems;
- develop skills and abilities in software design for VR/AR systems.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated

			software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Mobile device programming

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 36 hours (including 18 hours in an interactive form), and hours are also allocated for independent work of the student - 90 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of modern technologies for programming mobile devices.

Tasks:

- give a general idea of the general structure of common mobile platforms;
- identify the problems that arise in the development of software for mobile devices;
- to study the basic principles and stages of the life cycle of the development of information systems and components for mobile devices;
- consideration of ways to develop software for mobile devices;
- to master the methodology of software development for mobile devices;
- to form the skills of developing software for mobile devices;
- develop skills and abilities in designing software for mobile devices.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated software, interaction interfaces

			Has the skills to develop integrated software, interaction interfaces
production and technological	PC-5 Capable of testing, preparing and applying test datasets	PC-5.1 Understands the software testing process and software product life cycle	Knows the basic methods of software testing Can analyze software testing process Has the skills to analyze the software testing process and the life cycle of a software product
		PC-5.2 Able to use special software for automated testing	Knows the main types of special software for automated testing Able to configure special software for automated testing Proficient in using special software for automated testing
		PC-5.3 Able to compare and analyze, independently find the information necessary to restore systems after a failure	Knows the general principles of system recovery after a failure Able to compare and analyze, independently find the information necessary to restore systems after a failure Has the skills to analyze and search for information necessary to restore systems after a failure

Discipline abstract

Testing hypotheses and looking for patterns in data sets

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of testing hypotheses and searching for patterns in data arrays.

Tasks:

- give a general idea of the subject area of hypothesis testing and search for patterns in data arrays;
- identify problems that arise when testing hypotheses and searching for patterns in data sets;
- to study the basic principles of testing hypotheses and searching for patterns in data arrays;
- consider various approaches to testing hypotheses and searching for patterns in data sets;
- to study the basics of technology for testing hypotheses and searching for patterns in data arrays;
- to master the methodology of testing hypotheses and searching for patterns in data arrays;
- to form skills for testing hypotheses and searching for patterns in data arrays;
- develop skills and abilities in the field of testing hypotheses and searching for patterns in data sets.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results	PC-1.1 Collects, processes, analyzes and summarizes the results of experiments and research, domestic and international experience in the field of information systems and technologies	Knows the methodological basis for collecting and processing the results of research in the field of information systems and technologies Able to summarize the results of experiments and research in the field of information systems and technologies Has the skills to analyze domestic and foreign experience in the field of information systems and technologies
		PC-1.2 Conducts experiments and draws up the results of research and	Knows the methods of conducting experiments in the field of information systems and technologies Knows how to choose appropriate

		development in the field of information systems and technologies	methods for reporting research results at all stages of the life cycle of information systems Possesses the skills to substantiate the choice of applied research methods
		PC-1.3 Able to develop draft schedules and programs for carrying out individual elements of research and development work	Knows the principles of forming plans for conducting research in the field of information systems and technologies Able to develop research programs in the field of information systems and technologies Has the skills to develop draft schedules and programs for conducting individual elements of research and development work
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using	Knows the theoretical and applied foundations of big data analysis, data

		big data technologies	analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Systems of orientation in space

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of orientation systems in space.

Tasks:

- give a general idea of systems of orientation in space;
- identify the problems that arise in the development of systems of orientation in space;
- to study the basic principles of orientation in space;
- consideration of ways of orientation in urban space;
- study of the physical foundations of devices for orientation in space;
- master the methodology for developing orientation systems in space
- to form skills in the development of systems of orientation in space;
- develop skills and abilities in the design of microprocessor devices using the example of orientation systems in space.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops	Knows the tools and techniques for

		integrated software, interaction interfaces	developing integrated software Able to design and create integrated software, interaction interfaces Has the skills to develop integrated software, interaction interfaces

Discipline abstract

Basics of Navigation and Wireless Personal Area Networks

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of navigation and wireless personal networks.

Tasks:

- study of the main modern technologies of wireless networks;
- consideration of wireless transmission protocols;
- familiarity with the OSI reference model;
- study of the topology of wireless networks;
- consideration of the method of sharing access to the radio channel;
- development of skills in security analysis and authentication methods in wireless networks;
- mastering techniques for eliminating vulnerabilities and minimizing the risks of using personal networks;
- formation of the skill of building a threat model.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols	PC-6.1 Able to analyze the use and quality of use of network technologies	Knows the architecture, device and basic principles of network technologies Able to analyze the use and quality of use of network technologies Has the skills to analyze the use and quality of use of network technologies
		PC-6.2 Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems	Knows the possibilities of typical schemes for backup, archiving and recovery of information and communication and server systems Able to configure and apply schemes for backup, archiving and recovery of information and communication and server systems Proficient in the use of schemes for backup, archiving and recovery of information and communication and server systems
		PC-6.3 Capable of	Knows the tools and methods for

		identifying and eliminating incidents in information and communication and server systems	identifying incidents in information and communication and server systems Able to identify incidents in information and communication and server systems Has the skills to eliminate incidents in information and communication and server systems

Discipline abstract

Big Data Analytics

The total labor intensity of the discipline is 4 credit units / 144 academic hours. It is a discipline of the OP's choice, it is studied in the 4th year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 54 hours (including 36 hours in an interactive form), and hours are also allocated for independent work of the student - 72 hours (including 36 hours for preparing for exams).

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of analyzing large data arrays.

Tasks:

- give a general idea of the subject area of the analysis of large data arrays;
- identify problems that arise in the analysis of large data arrays;
- to study the basic principles of the analysis of large data arrays;
- consider various approaches to the analysis of large data arrays;
- to study the basics of technology for analyzing large data arrays;
- to master the methodology of analysis of large data arrays;
- to form the skills of analyzing large data arrays;
- develop skills and abilities in the field of analysis of large data arrays.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data	PC-4.1 Able to describe software requirements in terms of architecture	Knows the architecture, structure and functioning of modern information systems Able to analyze the architecture, structure and functioning of modern information systems Has the skills to analyze the architecture, structure and operation of information systems in order to select the optimal configuration of the information system
		PC-4.2 Applies methods and tools for designing software, data structures, databases, software interfaces	Knows the basic methods and tools for software design Able to apply methods and tools for designing software, data structures, databases, programming interfaces Has skills in applying methods and tools for designing software, data structures, databases, program interfaces
		PC-4.3 Develops integrated software, interaction interfaces	Knows the tools and techniques for developing integrated software Able to design and create integrated

			software, interaction interfaces Has the skills to develop integrated software, interaction interfaces
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Data auto-generation technologies

The total labor intensity of the discipline is 1 credit unit / 36 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with a test. The curriculum provides for laboratory work in the amount of 18 hours, and hours are also allocated for independent work of the student - 18 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of data auto-generation technologies.

Tasks:

- give a general idea of the subject area of data autogeneration;
- identify problems that arise during auto-generation of data;
- study the basic principles of data auto-generation;
- consider various approaches to auto-generation of data;
- study the basics of data auto-generation technologies;
- master the methodology of auto-generation of data;
- to form the skills of auto-generation of data;
- develop skills and abilities in the field of data auto-generation technologies.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data

		data	Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

AutoML technologies

The total labor intensity of the discipline is 1 credit unit / 36 academic hours. It is a discipline of the part formed by the participants of educational relations, OP, is studied in the 4th year and ends with a test. The curriculum provides for laboratory work in the amount of 18 hours, and hours are also allocated for independent work of the student - 18 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of AutoML technology.

Tasks:

- give an overview of technologyAutoML;
- identify problems that arise when usingAutoML;
- learn the basic principlesAutoML;
- develop application skillsAutoML;
- develop skills and abilities in the field of technologyAutoML.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and	Knows the theoretical and applied

		selects methods and tools for big data analysis	foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

quantum computing

The total labor intensity of the discipline is 1 credit unit / 36 academic hours. It is a discipline of the part formed by the participants of educational relations, OP, is studied in the 4th year and ends with a test. The curriculum provides for laboratory work in the amount of 18 hours, and hours are also allocated for independent work of the student - 18 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of quantum computing.

Tasks:

- give a general idea of the subject area of quantum computing;
- identify the problems that arise in quantum computing;
- study the basic principles of quantum computing;
- consider different approaches to quantum computing;
- learn the basics of quantum computing technology;
- master the methodology of quantum computing;
- to form skills in the field of quantum computing;
- develop skills and abilities in the field of quantum computing.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data

		data	Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and selects methods and tools for big data analysis	Knows the theoretical and applied foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Discipline abstract

Generative Adversarial Neural Networks

The total labor intensity of the discipline is 1 credit unit / 36 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with a test. The curriculum provides for laboratory work in the amount of 18 hours, and hours are also allocated for independent work of the student - 18 hours.

Implementation language: Russian.

Target:

To form and develop students' competencies, knowledge, practical skills and abilities in the field of generative-adversarial neural networks.

Tasks:

- give an overview ofgenerative adversarial neural networks;
- identify problems that arise when usinggenerative adversarial neural networks;
- study the basic principles of constructiongenerative adversarial neural networks;
- develop application skillsgenerative adversarial neural networks;
- develop skills and abilities in the fieldgenerative adversarial neural networks.

The planned learning outcomes in the discipline, correlated with the planned results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name of professional competence (the result of mastering)	Code and name of the indicator of achievement of competence	The name of the assessment indicator (the result of training in the discipline)
production and technological	PC-7Able to analyze the digital footprint of a person (a group of people) and information and communication systems	SC-7.1 Collects and prepares digital footprint data for analysis	Knows the structure and sources of the digital footprint, methods of data preprocessing Able to collect and pre-process digital footprint data Skilled in collecting and preparing digital footprint data for analysis
		PC-7.2 Tests hypotheses and identifies patterns in data sets	Knows data processing algorithms, software, libraries and frameworks for data analysis Able to apply data processing algorithms, specialized software for data analysis Has the skills to test hypotheses and search for patterns in data arrays
		PC-7.3 Visualizes the results of digital footprint analysis	Knowledge of data visualization techniques, specialized data visualization software Able to use specialized software, libraries and frameworks for data visualization Proficient in visualization of digital footprint analysis results
production and technological	PC-8Able to conduct analytical research using big data technologies	PC-8.1 Identifies big data sources for analysis, extracts, validates and cleans data	Knows big data sources, technologies for storing and processing big data Able to extract, clean, integrate and transform large amounts of data Skilled in identifying big data sources for analysis, extracting, validating and cleaning data
		PC-8.2 Analyzes and	Knows the theoretical and applied

		selects methods and tools for big data analysis	foundations of big data analysis, modern methods and tools for big data analysis Knows how to select appropriate methods and tools for big data analysis Possesses the skills of comparative analysis and reasonable choice of methods and tools for analyzing big data
		PC-8.3 Conducts analytical work using big data technologies	Knows the theoretical and applied foundations of big data analysis, data analysis technologies Able to plan and conduct analytical work using big data technologies Proficient in analytical work using big data technologies

Abstract of the practice program

Educational practice. Technological (design and technological) practice

1. Type of practice, method and form of its implementation

Type of practice: educational
Practice method:*stationary*
Practice form:*concentrated*
Practice type:*Technological (design and technological) practice*

2. General labor intensity, base of practice

The total labor intensity of the educational practice is 2 weeks, 3 credits, 108 acad. hours.
Practice base:*based on FEFU*

3. List of formed competencies in practice

Name of the category (group) of competencies	Code and name of competence (result of development)
design	PC-2 Able to work in an international project team in the field of information systems and technologies, analyze, plan project work
organizational and managerial	PC-3 Able to provide organizational support for the project in the field of information systems and technologies
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data

4. Place of practice in the structure of the educational program:

Educational practice. Technological (design and technological) practice is an integral part of the main professional educational program, included in block 2 "Practice" of the curriculum (index B2.V.01 (U)).

The total labor intensity of the practice (2 semester, 1 course) is 2 weeks, 3 credits, 108 hours.

The practice is based on the disciplines "Fundamentals of Algorithmization and Programming", "Discrete Mathematics", "Fundamentals of Mathematical Analysis".

To master this practice, students must:

- know the methods of developing programs for solving standard problems;
- know the basics of computer science;
- know the algorithmic programming language;
- know the information technologies used in the preparation of documents;
- be able to develop algorithms for solving problems using a computer;
- know how to check the correctness of the program.

5. Practice reporting form:

Report according to GOST 7.32

6. Intermediate certification form for practice:*assessment with score*

Abstract of the practice program

Educational practice. Research work (obtaining primary skills of research work)

1. Type of practice, method and form of its implementation

Type of practice: educational

Practice method:*stationary or mobile*

Form of practice: dispersed

Practice type:*Research work (obtaining primary skills of research work)*

2. General labor intensity, base of practice

The total labor intensity of educational practice is 3 credits, 108 acad. hours. The practice is carried out in parallel with the study of the disciplines of the mandatory part and the part formed by the participants in educational relations.

Practice base:*on the basis of FEFU and on the basis of IMCT partner enterprises.*

3. List of formed competencies in practice

Name of the category (group) of competencies	Code and name competencies (the result of mastering)
Systems and critical thinking	UK-1. Able to search, critically analyze and synthesize information, apply a systematic approach to solve tasks
Teamwork and Leadership	UK-3. Able to carry out social interaction and realize their role in the team
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results

4. Place of practice in the structure of the educational program:

Educational practice. Research work (obtaining primary skills in research work) is an integral part of the main professional educational program, included in block 2 "Practice" of the curriculum (index B2.V.02 (U)).

The total labor intensity of the practice (5th semester, 3rd course) is 16 weeks, 3 credits, 108 hours.

The practice is based on the disciplines "Fundamentals of Algorithmization and Programming", "Discrete Mathematics", "Fundamentals of Project Activities", "Fundamentals of System Analysis", "Tools of Information Systems", "Infocommunication Systems and Networks".

5. Practice reporting form:

Report according to GOST 7.32

6. Intermediate certification form for practice:*assessment with score*

Abstract of the practice program

Internship. Technological (design and technological) practice

1. Type of practice, method and form of its implementation

Type of practice: industrial
Practice method:*stationary or mobile*
Practice form: concentrated
Practice type:*Technological (design and technological) practice*

2. General labor intensity, base of practice

The total labor intensity of the practice is 2 weeks, 3 credits, 108 acad. hours.
Practice base:*on the basis of FEFU and on the basis of IMCT partner enterprises.*

3. List of formed competencies in practice

Name of the category (group) of competencies	Code and name of professional competence (the result of mastering)
design	PC-2 Able to work in an international project team in the field of information systems and technologies, analyze, plan project work
organizational and managerial	PC-3 Able to provide organizational support for the project in the field of information systems and technologies
production and technological	PC-5 Capable of testing, preparing and applying test datasets

4. Place of practice in the structure of the educational program:

Technological (design and technological) practice is an integral part of the main professional educational program, included in block 2 "Practice" of the curriculum (index B2.V.03 (P)).
The total labor intensity of practice (4th semester, 2nd year) is 2 weeks, 3 credits, 108 hours.
The practice is based on the disciplines "Fundamentals of Algorithmization and Programming", "Discrete Mathematics", "Physics", "Fundamentals of Project Activities", "Tools of Information Systems", "Infocommunication Systems and Networks".

5. Practice reporting form:

Report according to GOST 7.32

6. Intermediate certification form for practice:*assessment with score*

Abstract of the practice program

Internship. Practice for obtaining professional skills and experience

1. Type of practice, method and form of its implementation

Type of practice: industrial
Practice method:*stationary or mobile*
Practice form: concentrated
Practice type:*Practice for obtaining professional skills and experience*

2. General labor intensity, base of practice

The total labor intensity of the educational practice is 2 weeks, 3 credits, 108 acad. hours.

Practice base:*on the basis of FEFU and on the basis of IMCT partner enterprises.*

3. List of formed competencies in practice

Name of the category (group) of competencies	Code and name of professional competence (the result of mastering)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data
production and technological	PC-5 Capable of testing, preparing and applying test datasets
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols
production and technological	PC-7 Capable of analyzing the digital footprint of a person (a group of people) and information and communication systems
production and technological	PC-8 Able to conduct analytical research using big data technologies

4. Place of practice in the structure of the educational program:

Practice for obtaining professional skills and experience is an integral part of the main professional educational program, included in block 2 "Practice" of the curriculum (index B2.V.04 (P)).

The total labor intensity of practice (6th semester, 3rd course) is 2 weeks, 3 credits, 108 hours.

The practice is based on the disciplines "Fundamentals of Algorithmization and Programming", "Discrete Mathematics", "Physics", "Fundamentals of Project Activities", "Tools of Information Systems", "Infocommunication Systems and Networks", "Security of Information Systems and Information Protection in Networks" , "Technologies for

programming information systems", "Fundamentals of data management", "Methods and tools for designing information systems and technologies".

5. **Practice reporting form:**
   Report according to GOST 7.32
6. **Intermediate certification form for practice:***assessment with score*

Abstract of the practice program

Internship. Research work

1. Type of practice, method and form of its implementation

Type of practice: industrial
Practice method:*stationary or mobile*
Form of practice: dispersed
Practice type:*Research*

2. General labor intensity, base of practice

The total labor intensity of educational practice is 2 credits, 72 acad. hours. The practice is carried out in parallel with the study of the disciplines of the part formed by the participants in educational relations.

Practice base:*on the basis of FEFU and on the basis of IMCT partner enterprises.*

3. List of formed competencies in practice

Name of the category (group) of competencies	Code and name competencies (the result of mastering)
Systems and critical thinking	UK-1. Able to search, critically analyze and synthesize information, apply a systematic approach to solve tasks
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results
production and technological	PC-7 Capable of analyzing the digital footprint of a person (a group of people) and information and communication systems
production and technological	PC-8 Able to conduct analytical research using big data technologies

4. Place of practice in the structure of the educational program:

Educational practice. Research work (obtaining primary skills in research work) is an integral part of the main professional educational program, included in block 2 "Practice" of the curriculum (index B2.V.05 (P)).

The total labor intensity of the practice (semester 7, course 4) is 16 weeks, 3 credits, 108 hours.

The practice is based on the disciplines "Fundamentals of Algorithmization and Programming", "Discrete Mathematics", "Fundamentals of Project Activities", "Fundamentals of System Analysis", "Tools of Information Systems", "Infocommunication Systems and Networks", "Theory of Information and Coding", " Methods and tools for designing information systems and technologies", "Modeling of systems and technologies".

5. Practice reporting form:

Report according to GOST 7.32

6. Intermediate certification form for practice:*assessment with score*

Abstract of the practice program

Internship. Undergraduate practice

1. Type of practice, method and form of its implementation

Type of practice: industrial
Practice method:*stationary or mobile*
Practice form: concentrated
Practice type:*Undergraduate practice*

2. General labor intensity, base of practice

The total labor intensity of the practice is 4 weeks, 6 credits, 216 acad. hours.
Practice base: on the basis of FEFU and on the basis of IMCT partner enterprises.

3. List of formed competencies in practice

Name of the category (group) of competencies	Code and name of professional competence (the result of mastering)
research	PC-1 Able to conduct research on information systems and technologies, analyze scientific and technical information and experimental results
design	PC-2 Able to work in an international project team in the field of information systems and technologies, analyze, plan project work
organizational and managerial	PC-3 Able to provide organizational support for the project in the field of information systems and technologies
production and technological	PC-4 Capable of developing software using programming languages, defining and manipulating data
production and technological	PC-5 Capable of testing, preparing and applying test datasets
production and technological	PC-6 Capable of analyzing, developing and applying network technologies based on physical and logical layer protocols
production and technological	PC-7 Capable of analyzing the digital footprint of a person (a group of people) and information and communication systems
production and technological	PC-8 Able to conduct analytical research using big data technologies

4. Place of practice in the structure of the educational program:

Undergraduate practice is an integral part of the main professional educational program, included in block 2 "Practice" of the curriculum (index B2.V.05 (P)).
The total labor intensity of the practice (8th semester, 4th course) is 4 weeks, 6 credits, 216 hours.

The practice is based on the disciplines "Fundamentals of Algorithmization and Programming", "Discrete Mathematics", "Physics", "Fundamentals of Project Activities", "Tools of Information Systems", "Infocommunication Systems and Networks", "Security of Information Systems and Information Protection in Networks" , "Technologies for programming information systems", "Fundamentals of data management", "Methods and tools for designing information systems and technologies", "Administration of information systems and networks".

5. **Practice reporting form:**
   Report in accordance with GOST 7.32, draft version of the WRC
6. **Intermediate certification form for practice:***assessment with score*