KSPEU

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION
Federal State Budgetary Educational Institution of Higher Education
«KAZAN STATE POWER ENGINEERING UNIVERSITY»
(FSBEI HE «KSPEU»)

APPROVED BY
Director of the Institute of Digital Technologies and Economics
_____ Zainullin R.R.
«24» February 2026 г.

WORK PROGRAM OF THE DISCIPLINE

B1.M.09 Life safety

Field of study — 38.03.02 Management

Qualification — Bachelor's Degree

Kazan, 2026

The program was developed by:

Department Name	Position, academic degree, academic title	Full Name of Developer
IE	Associate Professor, Candidate of chemical sciences	Filippova F.M.

Approval	Name of Department	Date	Protocol No.	Signature
Approved	IE	22.01.2026	No. 1	_____ Head of Department, Doctor of Technical Sciences, Professor Nikolaeva L.A.
Approved	Management	10.02.2026	Protocol №5	_____ Head of the Department., Doctor of Social Sciences, prof.Makhiyanova A.V.
Approved	Educational and Methodological Council of IDTE	24.02.2026	Protocol №6	_____ Director, Ph.D., Associate Professor, Zainullin R.R..
Approved	Scientific Council of IDTE	24.02.2026	Protocol №6	_____ Director, Ph.D., Associate Professor, Zainullin R.R.

1. Purpose, Objectives, and Planned Learning Outcomes of the Subject

The purpose of mastering the subject "Life Safety" is to study the fundamentals of safe human interaction with the environment (industrial, domestic, urban, natural) and issues of protection from negative factors of emergency situations (ES).

The objectives of the discipline are:

- to study the principles of ensuring safe human interaction with the environment;
- to study the legal, organizational, and normative-technical foundations of life safety;
- to master the anatomical and physiological consequences of exposure to harmful and hazardous occupational factors and the principles of their identification;
- to analyze information about means of improving the safety and stability of technical means and technological processes;
- to master the fundamentals of ensuring the stability of functioning of economic facilities and technical systems in emergencies;
- to study the principles of developing measures to protect the population and personnel of economic facilities in emergencies.

Competencies and indicators formed in students:

Code and name of competency	Code and name of indicator
UC-8 – Capable of creating and maintaining safe living conditions in everyday life and professional activities to preserve the natural environment, ensure sustainable development of society, including during the threat and occurrence of emergencies and military conflict	UC-8.1 – Identifies possible threats to human life and health in everyday life and professional activities, creates and maintains safe conditions to ensure sustainable development of society
	UC-8.2 – Identifies problems related to violations of occupational safety at the workplace; proposes measures to prevent emergency situations, including during the emergence of military conflicts
	UC-8.3 – Explains the rules of conduct during natural and man-made emergencies; provides first aid, describes methods of participation in recovery measures
UC-11 – Capable of forming an intolerant attitude towards manifestations of extremism, terrorism, corrupt behavior and counteracting them in professional activities	UC-11.2 – Demonstrates understanding of extremism and terrorism as a particularly dangerous socio-legal phenomenon and a particularly grave crime

2. Place of the subject in the educational program structure

Prerequisite subjects: Physics, Ecology

Subsequent subjects: Internship (Work Placement), Pre-Graduation Internship.

3. Структура и содержание дисциплины

3.1. Structure and content of the subject

For full-time (on-campus) form of study

Type of educational work	Total credits	Total hours	Semester
			4
TOTAL LABOR INTENSITY OF THE SUBJECT	4	144	144
CONTACT WORK*	-	81	81
CLASSROOM WORK	1,89	68	68
Lectures	0,94	34	34
Practical (seminar) classes	0,5	18	18
Laboratory works	0,45	16	16
INDEPENDENT WORK OF THE STUDENT	2,11	76	76
Study of educational material	1,11	40	40
Course project	-	-	-
Course work	-	-	-
Preparation for intermediate certification	1	36	36
Intermediate certification:			Exam
			-

For part-time education 38.03.01, 38.03.02

Type of educational work	Total credits	Total hours	Semester
			6
TOTAL LABOR INTENSITY OF THE SUBJECT	4	144	144
CONTACT WORK*	-	62	62
CLASSROOM WORK	1,22	44	44
Lectures	0,5	18	18
Practical (seminar) classes	0,5	18	18
Laboratory works	0,22	8	8
INDEPENDENT WORK OF THE STUDENT	2,78	100	100
Study of educational material	2,52	91	91
Course project	-	-	-
Course work	-	-	-
Preparation for intermediate certification	0,25	9	9
Intermediate certification:			Exam
			-

3.2. The content of the subject, structured by sections and types of classes

Sections of the subject	Total hours	distribution of labor intensity by type of academic work				Forms and types of control	Indices of indicators of developing competencies
		lectures	lab. work.	practical. work	self-study		
Section 1 "Life Safety Management"	30	10	4	6	10	FC-1	UC-8.1.K, UC-8.2.K, UC-8.2.S, UC-11.2.K
Section 2 "Anthropogenic and man-made hazards and protection against them. Industrial sanitation"	40	12	6	6	16	FC-2	UC-8.1.K, UC-8.1.S, UC-8.1.Sk, UC-8.2.K, UC-8.2.S, UC-8.3.Sk
Section 3 Ensuring Security in the Event of Emergencies and Military Conflicts. Countering Extremism and Terrorism	38	12	6	6	14	FC-3	UC-8.1.S, UC-8.2.Sk, UC-11.2.K, UC-8.3.K, UC-8.3.S, UC-11.2.S, UC-11.2.Sk
Exam	36				36	**AM-1**	**UC-8.1, UC-8.2, UC-8.3, UC-11.2**
TOTAL	**144**	**34**	**16**	**18**	**76**		

3.3. Content of the subject

Section 1. Life Safety Management

Topic 1.1. Theoretical Foundations of Life Safety. The subject "Life Safety" as a science, its main tasks, place and role in training a specialist in the professional field. Basic concepts and definitions, occupational factors, their classification, concept of risk. Education in the field of life safety.

Topic 1.2. Legal and Regulatory Foundations of Life Safety. Legal, normative-technical, and organizational foundations of management, main legislative acts and regulatory documents on occupational safety.

Topic 1.3. State Supervision and Public Control over Compliance with Occupational Safety Standards. Types of control. State supervision over the fulfillment of occupational safety duties. Occupational safety management at the enterprise. Public control over compliance with legislation, norms, and rules on occupational safety. Training, briefing, and knowledge testing on occupational safety. Liability of persons for violating occupational safety requirements.

Topic 1.4. Special Assessment of Working Conditions. Hazardous and harmful occupational factors. Certification of workplaces.

Topic 1.5. Concept of Occupational Injuries. Methods of injury analysis. Providing first aid to victims at work. Investigation and recording of accidents.

Section 2. Anthropogenic and technogenic hazards and protection from them. Industrial sanitation

Topic 2.1. Anthropogenic Hazards and Protection from Them. Psychological aspects of occupational safety. Types of stress. Fatigue, psychological indicators, stages. Forms of human behavior in extreme situations. Professional selection. Methods for studying professionally important human qualities. Hazards of technical systems: failure, probability of failure.

Topic 2.2. Air of the Working Zone of the Industrial Environment. Definitions of the working zone, harmful substance, maximum permissible concentration (MPC), etc. Classification of harmful substances, their effect on the human body, protection against them. Microclimate of the industrial environment, main parameters. Optimal and permissible meteorological conditions in the working zone of the industrial environment. Ensuring normal parameters of the working zone air. Ventilation, classification. Thermal radiation. Protection from thermal radiation.

Topic 2.3. Vibroacoustics. Industrial noise. Classification of noises. Main physical characteristics of noise and noise sources. Levels of acoustic quantities. Noise measurement. Effect of noise on humans. Noise standardization. Methods of noise control. Main physical characteristics of vibrations. Impact of vibrations on humans. Vibration standardization. Methods of controlling industrial vibrations.

Topic 2.4. Industrial Lighting. Basic lighting engineering concepts and quantities. Types of lighting. Standardization. Quality indicators of lighting. Measuring light environment conditions. Methods for calculating industrial lighting.

Topic 2.5. Non-Ionizing and Ionizing Radiation. Electromagnetic safety. Sources of electromagnetic fields, classification. Influence of electromagnetic fields on human health. Standardization of exposure to electromagnetic fields. Protection from exposure to biologically active electromagnetic fields. Ionizing radiation. Characteristics of radiation exposure. Radiation standardization. Attenuation of IR when passing through various substances.

Topic 2.6. Electrical Safety. Effect of electric current on the human body. Electrical resistance of the human body. Factors influencing the outcome of electric shock to a person. Safety criteria for electric current. Classification of premises by the degree of danger of electric shock to a person. Touch and step voltage. Analysis of the danger of direct contact for a person in various electrical networks. Basic measures of protection against electric shock to a person in electrical installations: protective grounding, neutral grounding (grounding/earthing system), residual current devices (RCDs).

Section 3. Ensuring Safety During the Threat and Occurrence of Emergencies and Military Conflicts. Countering Extremism and Terrorism

Topic 3.1. Natural Emergencies. Concept of an emergency situation (ES). Sources, classification of ES. Natural emergencies, examples, forecasting, damaging factors, prevention and protection measures.

Topic 3.2. Technogenic Emergencies. Sources of technogenic ES. Definitions of accident and catastrophe. Technogenic incidents. Forecasting and

assessing the situation during a chemical accident. Concept of a chemical accident, damaging factors. Calculation of the depth and area of the contamination zone with chemically hazardous substances (CHS). Radiation accidents. Degrees of danger of emergency situations at nuclear power plants (NPPs). Forecasting and assessing the situation during accidents at NPPs. Zones of radioactive contamination of the area during an accident at an NPP.

Topic 3.3. Fire Safety. General information about combustion. Fire-hazardous properties of substances. Classification of explosives. Fire safety standards. Categorization of premises, buildings, and outdoor installations by explosion and fire hazard. Shock wave and its parameters. Methods and means of fire extinguishing.

Topic 3.4. Countering Extremism and Terrorism. Legal basis for countering terrorism and extremism. Requirements for anti-terrorist protection of objects (territories). Potential threats of a terrorist act.

3.4. Thematic plan of practical classes

Providing first aid to a victim in an accident.
Measuring noise parameters.
Industrial lighting. Requirements for it. Calculation of general lighting.
Air exchange calculation.
Social dangers. Healthy lifestyle.
Calculation of the grounding device for a closed 6, 10/0.4 kV substation.
Calculation of the grounding device for an open 110/35/10(6) kV substation.
Forecasting and assessing the situation during a chemical accident.
Fire safety at energy enterprises.

3.5. Thematic plan of laboratory works

Investigation and recording of industrial accidents.
Study of meteorological conditions at the workplace.
Work capacity (performance).
Electrical safety of three-phase AC networks with voltage up to 1000 V.
Study of the effectiveness of protective grounding.
Study of the protective properties of neutral grounding (grounding/earthing system).

3.6. Course project / Course work

This type of work is not provided for by the curriculum.

4. Evaluating learning outcomes

Evaluation of learning outcomes in the discipline is carried out within the framework of ongoing (formative) assessment and interim (summative) assessment, conducted according to the point-rating system.

Scale for evaluating learning outcomes in the discipline:

Competency code	Competency indicator code	Planned learning outcomes for this course	Level of formation of the competency indicator			
			high	medium	below average	low
			85 to 100	70 to 84	55 to 69	0 to 54
			evaluation scale			
			Excellent	Good	Satisfactory	unsatisfactory
			passed			failed
UC-8	UC-8.1	know:				
		legal, normative-technical, and organizational foundations of occupational safety, rational conditions for life activity	Fully knows the legal, normative-technical, and organizational foundations of occupational safety, rational conditions for life activity	Is well oriented in the legal, normative-technical, and organizational foundations of occupational safety, rational conditions for life activity.	Poorly knows the legal, normative-technical, and organizational foundations of occupational safety, rational conditions for life activity.	Lists the legal, normative-technical, and organizational foundations of occupational safety with gross errors.
		able to:				
		solve standard professional tasks in the field of creating safe living conditions to ensure sustainable development of society based on information and communication technologies	Freely solves standard professional tasks in the field of creating safe living conditions to ensure sustainable development of society based on information and communication technologies	Solves standard professional tasks in the field of creating safe living conditions to ensure sustainable development of society based on information and communication technologies with prompts.	Solves standard professional tasks in the field of creating safe living conditions to ensure sustainable development of society based on information and communication technologies with errors.	Cannot solve standard professional tasks in the field of creating safe living conditions to ensure sustainable development of society based on information and communication technologies.
		skills:				
		normative, legal foundations in the field of life safety, methods for identifying possible threats to human life and health in everyday life and professional activities	Skillfully uses normative, legal foundations in the field of life safety, methods for identifying possible threats to human life and health in everyday life and professional activities without errors	Uses normative, legal foundations in the field of life safety, methods for identifying possible threats to human life and health in everyday life and professional activities at a good level.	Uses normative, legal foundations in the field of life safety, methods for identifying possible threats to human life and health in everyday life and professional activities with significant shortcomings.	Does not know normative, legal foundations in the field of life safety, methods for identifying possible threats to human life and health in everyday life and professional activities.
	UC-8.2	know:				

		the consequences of exposure to traumatic, harmful, and damaging factors on a person at the workplace, methods and means of protection against them.	Excellently describes the consequences of exposure to traumatic, harmful, and damaging factors on a person at the workplace, applies methods and means of protection against them.	Sufficiently knows the consequences of exposure to traumatic, harmful, and damaging factors on a person at the workplace, methods and means of protection against them.	Partially describes the consequences of exposure to traumatic, harmful, and damaging factors on a person at the workplace, confuses methods and means of protection against them.	Cannot list any consequences of exposure to traumatic, harmful, and damaging factors on a person at the workplace, methods and means of protection against them.
		able to:				
		make a choice of technical solutions to ensure safe working conditions at the workplace.	Freely makes a choice of technical solutions to ensure safe working conditions at the workplace.	Is well oriented in the choice of technical solutions to ensure safe working conditions at the workplace.	Makes gross errors in choosing technical solutions to ensure safe working conditions at the workplace.	Cannot correctly make a choice of technical solutions to ensure safe working conditions at the workplace.
		skills:				
		the ability to organize measures to prevent emergency situations, including during the emergence of military conflicts.	Possesses a high ability to organize measures to prevent emergency situations, including during the emergence of military conflicts.	Able to organize measures to prevent emergency situations, including during the emergence of military conflicts, with a little help.	Able to carry out measures to prevent emergency situations, including during the emergence of military conflicts, but cannot organize them.	Unable to organize measures to prevent emergency situations, including during the emergence of military conflicts.
	UC-8.3	know:				
		rules of conduct during natural and man-made emergencies, as well as methods of participation in recovery measures.	Correctly states the rules of conduct during natural and man-made emergencies, as well as methods of participation	Sufficiently lists the rules of conduct during natural and man-made emergencies, as well as methods of participation in recovery	Lists the rules of conduct during natural and man-made emergencies, as well as methods of participation in recovery	Cannot even partially list the rules of conduct during natural and man-made emergencies, as well as methods of participation

			in recovery measures.	measures.	measures with errors.	in recovery measures.
		able to:				
		use first aid techniques and methods of protection in emergency situations.	Easily uses first aid techniques and methods of protection in ES conditions.	Sufficiently uses first aid techniques and methods of protection in ES conditions.	Is able to use first aid techniques and methods of protection in ES conditions.	Is unable to use first aid techniques and methods of protection in ES conditions.
		skills:				
		the methodology of providing first aid and methods of protection in emergency situations and military conflicts.	the methodology of providing first aid and methods of protection in emergency situations and military conflicts.	the methodology of providing first aid and methods of protection in emergency situations and military conflicts.	the methodology of providing first aid and methods of protection in emergency situations and military conflicts.	the methodology of providing first aid and methods of protection in emergency situations and military conflicts.
UC-11	UC-11.2	know:				
		the legal basis for countering terrorism and extremism.	Fully knows the legal basis for countering terrorism and extremism.	Is well oriented in the legal basis for countering terrorism and extremism.	Confuses the basic concepts of the legal basis for countering terrorism and extremism.	Cannot define "terrorism" and "extremism".
		able to:				
		analyze factors contributing to extremism and terrorism as particularly dangerous socio-legal phenomena.	Provides a complete analysis of factors contributing to extremism and terrorism as particularly dangerous socio-legal phenomena.	Provides an analysis of factors contributing to extremism and terrorism as particularly dangerous socio-legal phenomena with prompts.	Provides an analysis of factors contributing to extremism and terrorism as particularly dangerous socio-legal phenomena with gross errors.	Cannot analyze factors contributing to extremism and terrorism as particularly dangerous socio-legal phenomena.
		skills:				
		skills in assessing various phenomena of public life to identify signs of	Freely assesses phenomena of public life to identify	Assesses phenomena of public life to identify signs of	Assesses phenomena of public life to identify signs of	Cannot assess phenomena of public life to identify

		extremism and terrorism.	signs of extremism and terrorism.	extremism and terrorism with inaccuracies.	extremism and terrorism with several errors.	signs of extremism and terrorism.

The assessment materials for conducting formative assessment and interim assessment are provided in the Appendix to the working program of the discipline.

A complete set of tasks and materials necessary for evaluating learning outcomes in the discipline is stored at the developer's department.

5. Educational, methodological, and informational support of the discipline

5.1. Educational and methodological support

5.1.1. Main literature

1. Mikryukov, V.Y. (2022). Life Safety: textbook. Moscow: Knorus. URL: https://www.book.ru/book/940372. (In Russ.)

2. Tyagunov, G.V., Volkova, A.A., Baryshev, E.E., & Shishkunov, V.G. (2023). Life Safety. Lecture Notes: textbook. Moscow: KnoRus. URL: https://book.ru/book/947534. (In Russ.)

3. Yakubovskaya, N.A., Khmelev, V.E., Stepanova, E.V. et al. (2023). Life Safety: textbook. I.V. Svitnev (Ed.). Moscow: KnoRus. URL: https://book.ru/book/949308. (In Russ.)

4. Belov, S.V., Devisilov, V.A., Ilnitskaya, A.V. et al. (2004). Life Safety: textbook for universities. S.V. Belov (Ed.). (4th ed., rev. and exp.). Moscow: Vysshaya Shkola. (In Russ.)

5.1.2. Additional literature

1 Averyanova, Y.A., Filippova, F.M., Gainullina, L.R., & Pigilova, R.N. (Comps.). (2022). Life Safety: practicum: in 2 parts. Kazan: KSPEU. URL: https://lib.kgeu.ru/ (In Russ.)

2. Zelenkin, V.G., Babayan, A.L., Borovik, S.I. et al. (2022). Life Safety: textbook. A.I. Sidorov (Ed.). Moscow: KnoRus. URL: https://book.ru/book/947097. (In Russ.)

3. Zanko, N.G., Malayan, K.R., & Rusak, O.N. (2022). Life Safety: textbook. (17th ed., ster.). Saint Petersburg: Lan. URL: https://e.lanbook.com/book/209837. (In Russ.)

4. Datskov, I.I. (2022). Electrical Safety in the Agro-Industrial Complex: textbook. Saint Petersburg: Lan. URL: https://e.lanbook.com/book/212999. (In Russ.)

5. Lipski, S.A., & Fatkulina, A.V. (2022). Life Safety: textbook. Moscow: KnoRus. URL: https://book.ru/book/944688. (In Russ.)

6. Balakov, Y.N. (2017). Safety of Power Installations in Questions and Answers: practical guide: in 2 parts. Part 2: Occupational Safety and Safety Techniques. Moscow: MPEI Publishing House. URL: http://www.studentlibrary.ru/book/ISBN9785383011201.html. (In Russ.)

5.2. Information support

5.2.1. Electronic and internet resources

1. Ministry of Labor and Social Protection of the Russian Federation: official website. – 2023. – URL: https://rosmintrud.ru/opendata

2. Professional Standards of the Ministry of Labor and Social Protection of the Russian Federation: official website. – 2023. URL: http://profstandart.rosmintrud.ru/obshchiy-informatsionnyy-blok/natsionalnyy-reestr-professionalnykh-standartov/

3. Federal Agency for Technical Regulation and Metrology: official website – 2023. – URL: http://protect.gost.ru/

4. EBS "Lan": electronic library system: website. – Moscow, 2023. – URL: https://e.lanbook.com/

5. Portal "Open Education": official website. – Moscow, 2023. – URL: http://npoed.ru

5.2.2. Professional databases / Information and reference systems

1. Russian National Library: electronic library system: website. – Moscow, 2023. – URL: http://nlr.ru/

2. GRAMOTA.RU: reference and information portal: website. – Moscow, 2023. URL: http://gramota.ru/

3. "Garant": information and reference system: website. – Moscow, 2023. – URL: http://www.garant.ru/

4. "Consultant Plus": information and reference system: website. – Moscow, 2023. – URL: http://www.consultant.ru/

5.2.3. Licensed and freely distributed software of the discipline

1. Windows 7 Professional (Pro) User operating system. SoftLineTrad CJSC, License No. 2011.25486 dated 28.11.2011, Non-exclusive right. Perpetual.

2. LMS Moodle Software for effective online interaction between teacher and student. Free license. Non-exclusive right. Perpetual.

3. Office Standard 2007 Russian OLP NL AcademicEdition+: office applications. Contract No. 21/2010 dated 04.05.2010, licensor - Soft Line Trade CJSC, license type - non-exclusive right, license validity period - perpetual.

6. Material and Technical Support of the Discipline

Type of Academic Work	Name of Academic Audience, Specialized Laboratory	List of Necessary Equipment and Technical Teaching Aids
Lectures	Classroom for lecture-type classes	Specialized educational furniture, technical teaching aids for presenting educational information to a large audience (multimedia projector, computer (laptop), screen), demonstration equipment, educational and visual aids.
Practical Classes	Classroom for seminar-type classes, group and individual consultations, current control and interim assessment	Specialized educational furniture, technical teaching aids (multimedia projector, computer (laptop), screen), etc.
Laboratory Works	Educational Laboratory "Occupational safety laboratory" D-610	Specialized laboratory equipment: laboratory stand "3-phase networks", educational furniture for 32 seats, technical teaching aids (multimedia projector, computer (laptop), interactive whiteboard), 4 computers with Internet access for student testing.
	Computer class with Internet access V-600a	Specialized educational furniture for 30 seats, 30 computers, technical teaching aids (multimedia projector, computer (laptop), screen), video cameras, software.
Independent Work	Computer class with Internet access V-600a	Specialized educational furniture for 30 seats, 30 computers, technical teaching aids (multimedia projector, computer (laptop), screen), video cameras, software.

	Library reading room	Specialized furniture, computer equipment with Internet access and access to the Electronic Information Educational System, screen, multimedia projector, software.

7. Features of organizing educational activities for persons with disabilities and individuals with limited health capabilities

Persons with disabilities and individuals with limited health capabilities have the opportunity to move freely from one educational and laboratory building to another, access all floors of educational and laboratory buildings, and study in educational and other premises, taking into account the peculiarities of their psychophysical development and health status.

For teaching persons with disabilities and individuals with limited health capabilities with musculoskeletal disorders, conditions for unhindered access to all educational premises are ensured. Information on the special conditions created for students with disabilities is posted on the university's website www//kgeu.ru. There is an opportunity for providing technical assistance by an assistant, as well as the services of sign language interpreters and typhlo-sign language interpreters.

To adapt the perception of reference and educational material on the discipline for persons with disabilities and individuals with hearing impairments, the following conditions are ensured:

- for better orientation in the classroom, signals indicating the start and end of the class are used (the word "bell" is written on the board).
- The teacher attracts the attention of a hard-of-hearing student with a gesture (a hand on the shoulder, a gentle pat).
- When speaking with the student, the teacher looks at them, speaks clearly, in short sentences, allowing for lip-reading.
- Compensation for difficulties in speech and intellectual development of hard-of-hearing students is carried out by:
- Using diagrams, drawings, computer presentations with hyperlinks commenting on individual components of the image.
- Regular use of exercises for graphical highlighting of essential features of objects and phenomena.
- Providing the student with the opportunity to receive targeted advice via email as needed.
- To adapt the perception of reference, educational, and informational material provided by the educational program for persons with disabilities and individuals with visual impairments, the following conditions are ensured:
- The official website on the Internet is adapted considering the special needs of the visually impaired; large-print reference information about the schedule of training sessions is provided.
- The teacher and their interlocutor (if necessary) present at the class introduce themselves to the students, each time naming the person the teacher is addressing.
- Actions, gestures, and movements of the teacher are briefly and clearly

commented on.

- Printed information is provided in large font (from 18 points) and fully voiced.
- The necessary level of illumination of the premises is ensured.
- Students are given the opportunity to use computers during classes and the right to record explanations on a dictaphone (at the student's request).

The form of ongoing and interim assessment for students with disabilities is determined by the teacher in accordance with the curriculum. If necessary, a student with disabilities, taking into account their individual psychophysical characteristics, is given the opportunity to undergo interim assessment orally, in writing on paper, in writing on a computer, in the form of testing, etc., or additional time is provided to prepare an answer.

8. Methodological recommendations for teachers on organizing educational work with students

Methodological support for the process of student education is one of the determining factors for high-quality education. A university teacher, demonstrating high professionalism, erudition, a clear civic position, self-discipline, and a creative approach to solving professional tasks, contributes to the formation of a harmonious personality during the educational process.

When implementing the discipline, the teacher can use the following methods of educational work:

- Methods of forming personality consciousness (conversation, dispute, suggestion, instruction, control, explanation, example, self-control, story, advice, persuasion, etc.).
- Methods of organizing activities and forming behavior experience (task, public opinion, pedagogical requirement, assignment, habituation, creating educational situations, training, exercise, etc.).
- Methods of motivating activity and behavior (approval, encouragement of social activity, reprimand, creating success situations, creating situations for emotional and moral experiences, competition, etc.).
- When implementing the discipline, the teacher must consider the following areas of educational activity:

Civic and Patriotic Education:

- Formation of a holistic worldview, Russian identity, respect for one's family, society, state, spiritual, moral, and socio-cultural values accepted in the family and society, for national, cultural, and historical heritage, formation of a desire for its preservation and development.
- Formation of an active civic position among students based on traditional cultural, spiritual, and moral values of Russian society, to enhance the ability to responsibly exercise their constitutional rights and duties.
- Development of legal and political culture of students, expansion of constructive participation in decisions affecting their rights and interests, including in various forms of self-organization, self-government, socially significant activities.

- Formation of motives, moral and semantic attitudes of the individual, allowing to resist extremism, xenophobia, discrimination on social, religious, racial, national grounds, interethnic and interfaith intolerance, and other negative social phenomena.

Spiritual and Moral Education:

- Cultivating a sense of dignity, honor and honesty, conscientiousness, respect for parents, teachers, and the elderly.
- Formation of principles of collectivism and solidarity, a spirit of mercy and compassion, the habit of caring for people in difficult life situations.
- Formation of solidarity and a sense of social responsibility towards people with disabilities, overcoming psychological barriers towards people with disabilities.
- Formation of an emotionally rich and spiritually elevated attitude towards the world, the ability and skill to convey one's aesthetic experience to others.

Cultural and Educational Education:

- Formation of an aesthetic picture of the world.
- Formation of respect for the cultural values of the native city, region, country.
- Increasing the cognitive activity of students.

Scientific and Educational Education:

- Formation of a scientific worldview among students.
- Formation of the ability to acquire knowledge.
- Formation of skills in analyzing and synthesizing information, including in the professional field.

Amendments and Approvals for the New Academic Year

№	Section of amendment	Date of amendment	Content of amendments	Approved by head of Department	Approved by chairman of the educational and methodological commission
1	2	3	4	5	6
1					
2					
3					

Appendix to the working program of the discipline

KSPEU

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Federal State Budgetary Educational Institution of Higher Education
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(FSBEI HE «KSPEU»)

ASSESSMENT MATERIALS
for the discipline

B1.M.09 Life safety

Kazan, 2026

The assessment materials for the subject are designed to evaluate learning outcomes for compliance with indicators of competency achievement.

Evaluation of learning outcomes in the subject is carried out within the framework of formative assessment (FC) and interim assessment, conducted according to the point-rating system.

1. Technological Map

Semester 4

Section Name	Forms and Type of Control	Rating Indicators							
		I Formative	Extra points to FA1	II Formative	Extra points to FA2	III Formative	Extra points to FA3	Итого	Промежуточная аттестация
Section 1. "Life Safety Management"	**FA1**	**15**	**0-15**					**15-30**	**15-30**
Test or written quiz		10							
Defense of laboratory work		3							
Report on independent work		2							
Section 2. "Anthropogenic and Technogenic Hazards and Protection from Them. Industrial Sanitation"	**FA2**			**20**	**0-15**			**20-35**	**20-35**
Test or written quiz				10					
Defense of laboratory work				5					
Completion of individual assignments (essays)				5					
Section 3. "Ensuring Safety During the Threat and Occurrence of Emergencies and Military Conflicts. Countering Extremism and Terrorism"	**FA3**					**20**	**0-15**	**20-35**	**20-35**
Test or written quiz						10			
Defense of laboratory work						5			
Report on independent work						5			
Interim Assessment (Exam)	**AM**								**0-45**
Interim assessment task									0-15
In written form by tickets									0-30

2. Assessment Materials for Formative and Interim Assessments

Scale for evaluating learning outcomes in the discipline:

Competency code	Competency indicator code	Planned learning outcomes for this course	Level of formation of the competency indicator			
			high	medium	below average	low
			85 to 100	70 to 84	55 to 69	0 to 54
			evaluation scale			
			Excellent	Good	Satisfactory	unsatisfactory
			passed			failed
UC-8	UC-8.1	know:				
		legal, normative-technical, and organizational foundations of occupational safety, rational conditions for life activity	Fully knows the legal, normative-technical, and organizational foundations of occupational safety, rational conditions for life activity	Is well oriented in the legal, normative-technical, and organizational foundations of occupational safety, rational conditions for life activity.	Poorly knows the legal, normative-technical, and organizational foundations of occupational safety, rational conditions for life activity.	Lists the legal, normative-technical, and organizational foundations of occupational safety with gross errors.
		able to:				
		solve standard professional tasks in the field of creating safe living conditions to ensure sustainable development of society based on information and communication technologies	Freely solves standard professional tasks in the field of creating safe living conditions to ensure sustainable development of society based on information and communication technologies	Solves standard professional tasks in the field of creating safe living conditions to ensure sustainable development of society based on information and communication technologies with prompts.	Solves standard professional tasks in the field of creating safe living conditions to ensure sustainable development of society based on information and communication technologies with errors.	Cannot solve standard professional tasks in the field of creating safe living conditions to ensure sustainable development of society based on information and communication technologies.
		skills:				
		normative, legal foundations in the field of life safety, methods for identifying possible threats to human life and health in everyday life and professional activities	Skillfully uses normative, legal foundations in the field of life safety, methods for identifying possible threats to human life and health in everyday life and professional activities without errors	Uses normative, legal foundations in the field of life safety, methods for identifying possible threats to human life and health in everyday life and professional activities at a good level.	Uses normative, legal foundations in the field of life safety, methods for identifying possible threats to human life and health in everyday life and professional activities with significant shortcomings.	Does not know normative, legal foundations in the field of life safety, methods for identifying possible threats to human life and health in everyday life and professional activities.

		know:				
		the consequences of exposure to traumatic, harmful, and damaging factors on a person at the workplace, methods and means of protection against them.	Excellently describes the consequences of exposure to traumatic, harmful, and damaging factors on a person at the workplace, applies methods and means of protection against them.	Sufficiently knows the consequences of exposure to traumatic, harmful, and damaging factors on a person at the workplace, methods and means of protection against them.	Partially describes the consequences of exposure to traumatic, harmful, and damaging factors on a person at the workplace, confuses methods and means of protection against them.	Cannot list any consequences of exposure to traumatic, harmful, and damaging factors on a person at the workplace, methods and means of protection against them.
		able to:				
	UC-8.2	make a choice of technical solutions to ensure safe working conditions at the workplace.	Freely makes a choice of technical solutions to ensure safe working conditions at the workplace.	Is well oriented in the choice of technical solutions to ensure safe working conditions at the workplace.	Makes gross errors in choosing technical solutions to ensure safe working conditions at the workplace.	Cannot correctly make a choice of technical solutions to ensure safe working conditions at the workplace.
		skills:				
		the ability to organize measures to prevent emergency situations, including during the emergence of military conflicts.	Possesses a high ability to organize measures to prevent emergency situations, including during the emergence of military conflicts.	Able to organize measures to prevent emergency situations, including during the emergence of military conflicts, with a little help.	Able to carry out measures to prevent emergency situations, including during the emergence of military conflicts, but cannot organize them.	Unable to organize measures to prevent emergency situations, including during the emergence of military conflicts.
		know:				
	UC-8.3	rules of conduct during natural and man-made emergencies, as well as methods of participation in recovery measures.	Correctly states the rules of conduct during natural and man-made emergencies, as well as methods of	Sufficiently lists the rules of conduct during natural and man-made emergencies, as well as methods of participation	Lists the rules of conduct during natural and man-made emergencies, as well as methods of participation	Cannot even partially list the rules of conduct during natural and man-made emergencies, as well as methods of

			participation in recovery measures.	in recovery measures.	in recovery measures with errors.	participation in recovery measures.
		able to:				
		use first aid techniques and methods of protection in emergency situations.	Easily uses first aid techniques and methods of protection in ES conditions.	Sufficiently uses first aid techniques and methods of protection in ES conditions.	Is able to use first aid techniques and methods of protection in ES conditions.	Is unable to use first aid techniques and methods of protection in ES conditions.
		skills:				
		the methodology of providing first aid and methods of protection in emergency situations and military conflicts.	the methodology of providing first aid and methods of protection in emergency situations and military conflicts.	the methodology of providing first aid and methods of protection in emergency situations and military conflicts.	the methodology of providing first aid and methods of protection in emergency situations and military conflicts.	the methodology of providing first aid and methods of protection in emergency situations and military conflicts.
UC-11	UC-11.2	know:				
		the legal basis for countering terrorism and extremism.	Fully knows the legal basis for countering terrorism and extremism.	Is well oriented in the legal basis for countering terrorism and extremism.	Confuses the basic concepts of the legal basis for countering terrorism and extremism.	Cannot define "terrorism" and "extremism".
		able to:				
		analyze factors contributing to extremism and terrorism as particularly dangerous socio-legal phenomena.	Provides a complete analysis of factors contributing to extremism and terrorism as particularly dangerous socio-legal phenomena.	Provides an analysis of factors contributing to extremism and terrorism as particularly dangerous socio-legal phenomena with prompts.	Provides an analysis of factors contributing to extremism and terrorism as particularly dangerous socio-legal phenomena with gross errors.	Cannot analyze factors contributing to extremism and terrorism as particularly dangerous socio-legal phenomena.
		skills:				
		skills in assessing various phenomena of public life to	Freely assesses phenomena of public life	Assesses phenomena of public life to identify	Assesses phenomena of public life to identify	Cannot assess phenomena of public life

		identify signs of extremism and terrorism.	to identify signs of extremism and terrorism.	signs of extremism and terrorism with inaccuracies.	signs of extremism and terrorism with several errors.	to identify signs of extremism and terrorism.

Excellent (Grade "5"): awarded for completing practical and laboratory work during the semester; completing test tasks; demonstrating a deep understanding of the main processes in the subject area being studied; the ability to explain the essence of phenomena, processes, events, and to draw conclusions and generalizations; and providing complete and substantive answers to the exam ticket questions (both theoretical and practical tasks).

Good (Grade "4"): awarded for completing practical and laboratory work during the semester; completing test tasks; demonstrating an understanding of the main processes in the subject area being studied; the ability to explain the essence of phenomena and processes; and providing answers to the exam ticket questions (either the theoretical or the practical task).

Satisfactory (Grade "3"): awarded for completing practical and laboratory work during the semester; completing test tasks; demonstrating knowledge and understanding of the basic concepts of the subject area being studied.

Unsatisfactory (Grade "2"): awarded for weak and incomplete completion of practical and laboratory work during the semester, and for poor performance on test tasks.

3. List of Assessment Tools

Brief description of the assessment tools used for formative assessment of academic progress and interim assessment of students in the subject:

Name of Assessment Tool	Brief Description of the Assessment Tool	Description of the Assessment Tool
Report on Laboratory Work (RLW)	Completion of laboratory work, processing of test, measurement, or experiment results. Preparation of a report, defense of laboratory work results based on the report.	List of tasks and questions for the defense of laboratory work, list of requirements for the report.
Practical Task (PT)	A means of assessing the ability to apply acquired theoretical knowledge in a practical situation. The task is aimed at evaluating competencies in the subject and contains clear instructions for execution or an algorithm of actions.	Set of problems and tasks.
Essay (Ess)	A product of a student's independent work, representing a brief written summary of the results of a theoretical analysis of a specific scientific (educational-research) topic.	Essay topics.
Test (Test)	A system of standardized tasks that allows automating	Set of test tasks

	the procedure for measuring the level of knowledge and skills of a student.	

4. List of Control Tasks or Other Materials Necessary for Assessing Knowledge, Skills, and Abilities Characterizing the Stages of Competency Formation in the Process of Mastering the Subject

Examples of tasks for formative assessment FA1: "Life Safety Management"

Competency being assessed: UC-8 – Capable of creating and maintaining safe living conditions in everyday life and professional activities to preserve the natural environment, ensure sustainable development of society, including during the threat and occurrence of emergencies and military conflicts.

UC-8.1 – Identifies possible threats to human life and health in everyday life and professional activities, creates and maintains safe conditions to ensure sustainable development of society.

Test 1

1. Which concept corresponds to the following definition: "*This is a region of the biosphere transformed by people using technical means to best meet their needs*"?

Correct answers: Technosphere, technosphere

2. Complete the sentence:

Physical and neuro-psychological overloads belong to ……. occupational factors.

Correct answer: psychophysiological

3. Insert the missing phrase:

……. is a system for preserving the life of workers during the labor process, which includes legal, socio-economic, organizational-technical, therapeutic, preventive and other measures.

Correct answers: Occupational safety, occupational safety

4. Is the following statement correct?

Regulatory and technical documents include the Federal Law "On the Fundamentals of Occupational Safety in the Russian Federation" and occupational safety instructions.

Correct answer: no, the statement is incorrect.

5. Choose the correct answer:

According to the Labor Code of the Russian Federation, the normal working hours shall not exceed …….

a) 40 hours per week;

b) 2000 hours per year;

c) 8 hours per day;

d) 150 hours per month.

Correct answer: a) 40 hours per week.

UC-8.2 – Identifies problems related to violations of occupational safety at the workplace; proposes measures to prevent emergency situations, including during the emergence of military conflicts.

Test 2

1. Complete the statement:

Occupational safety management in the Russian Federation is carried out by …….

Correct answer: Ministry of Labour and Social Protection of the Russian Federation

2. Insert the word(s):

Disciplinary liability for violations of the legislation of the Russian Federation and occupational safety rules includes ……..

Correct answers: reprimand, rebuke, demotion, dismissal

3. Is the following statement correct?

In the event of a group accident, an accident with possible disability or fatality, the employer (or their representative) is required to notify the relevant authorities within 24 hours.

Correct answer: yes, it is correct.

4. Into which classes are harmful chemical substances divided according to toxicity and hazard indicators?

a) highly hazardous and moderately hazardous

b) extremely hazardous, moderately hazardous, highly hazardous

c) extremely hazardous, moderately hazardous, and slightly hazardous

d) 4 classes: a) extremely hazardous; b) highly hazardous; c) moderately hazardous; d) slightly hazardous.

Correct answer:

d) 4 classes: a) extremely hazardous; b) highly hazardous; c) moderately hazardous; d) slightly hazardous.

5. Complete the following statement:

In the event of an accidental shutdown of the working lighting, …….. lighting must be switched on.

Correct answer: emergency

UC-8.3 – Explains the rules of conduct during natural and man-made emergencies; provides first aid, describes methods of participation in recovery measures.

Test 3

1. Is the following statement correct?

Accidents and catastrophes in transport are classified as natural emergencies.

Correct answer: no, it is incorrect.

2. Complete the following definition:

A conventional quantity characterizing the energy of an earthquake is called ……..

Correct answer: magnitude

3. Select the correct order (3 answers required).

Establish the sequence of actions for providing first aid when an acid solution comes into contact with the skin:

a) neutralize with an alkali solution;

b) consult a doctor;

c) apply a sterile bandage;

d) neutralize with a baking soda solution;

e) rinse with running water for 10 minutes.

Correct answer:

1 – e) rinse with running water for 10 minutes;

2 – c) apply a sterile bandage;

3 – b) consult a doctor.

4. Complete the statement:

The protocol for performing cardiopulmonary resuscitation (CPR) is ……..

Correct answer: 30 compressions – 2 breaths

5. Insert the correct word/phrase:

Atmospheric electrical charges that attract lightning accumulate ……..

Correct answer: a) on sharp points or on freestanding objects similar in shape to points

Competency being assessed: UC-11 – Capable of forming an intolerant attitude towards manifestations of extremism, terrorism, corrupt behavior and counteracting them in professional activities.

UC-11.2 – Demonstrates understanding of extremism and terrorism as a particularly dangerous socio-legal phenomenon and a particularly grave crime.

Test 4

1. Complete the statement:

According to Article 205 of the Criminal Code of the Russian Federation, the punishment for terrorism is ……..

Correct answer: imprisonment for a term of 6 to 15 years or more, as well as life imprisonment.

2. *Terrorism today is diverse and multinational; it has ceased to be a state problem and has become an international disaster.* Is this true?

Correct answer: yes.

3. *What is the main goal of terrorists?*

a) destruction of the enemy

b) both options are correct

c) psychological influence

Correct answer: c) psychological influence.

4. *Anti-terrorist protection of specific objects (buildings, structures, vehicles) does not help at all in the event of a terrorist attack.* Is this true?

Correct answer: no.

5. Insert the missing definition:

…… is the spread of ideas of hatred towards people of a different nationality, social, racial, linguistic or religious affiliation.

Correct answer: propaganda of extremism.

4.1.1 Questions for testing FA1: "Life Safety Management"

1. The science of comfortable and safe human interaction with the technosphere is ……. *(life safety)*

2. Complete the sentence: The biosphere includes ……. *(the upper layer of the lithosphere, the hydrosphere, the lower layer of the atmosphere)*

3. The characteristic states of interaction in the "human – environment" system are ……. *(optimal/comfortable and permissible)*

4. Match the types of harmful occupational factors with their components:

1. Biological	a) Physical overloads
2. Psychophysiological	b) Dust
3. Physical	c) Bacteria and viruses
4. Chemical	d) Noise

Correct answer: 1 – c); 2 – a); 3 – d); 4 – b

5. Is the following statement correct?

The Constitution of the Russian Federation belongs to the legislative documents on occupational safety. *(yes, it is correct)*

6. Complete the sentence: Standards of subsystem 4 establish safety requirements for ……. *(production processes)*

7. Is the following statement about the rights of state supervision inspectors correct: "They have the right to be engaged to eliminate violations of safety requirements"? *(no, it is incorrect)*

8. Choose the correct answer:

…… control is carried out in three stages.

a) administrative-public;
b) operational;
c) departmental;
d) state.
Correct answer: a) administrative-public

9. Insert the word:
A reprimand and a rebuke are measures of …… liability. *(disciplinary)*
10. The accident investigation report according to Form N-1 is stored for …… years. *(forty-five / 45)*

4.1.2 Questions for testing FA2: "Anthropogenic and Technogenic Hazards and Protection from Them. Industrial Sanitation"

1. Complete the definition:
The concentration of a chemical substance in the environment, upon exposure to which periodically or throughout life, directly or indirectly through ecological systems, no changes occur in the health status of present and future generations, is called _____. *(MPC / maximum permissible concentration of a harmful substance)*
2. Complete the sentence:
…… is the ratio of indoor natural light illuminance to outdoor illuminance.
Correct answers: DFR, daylight factor, daylight factor
3. The permissible sound limit in the workplace is …… dB. *(80)*
4. Complete the definition:
Sensitization is a state of the body in which, under the influence of harmful substances, …… occurs. *(increased sensitivity)*
5. Complete the sentence:
…… is a combination of a light source and lighting fixtures. *(Luminaire, luminaire)*
6. Air movement speed is determined using ……. *(an anemometer)*
7. Complete the definition:
A ventilation system in which air movement is achieved due to the pressure difference between the outside and inside of a building is called ……. *(natural / natural ventilation)*
8. Select 2 correct answers:
Methods for reducing noise at its source:
a) use of low-noise materials
b) sound insulation
c) sound absorption
d) increasing the precision of parts manufacturing

Correct answers: a) use of low-noise materials and d) increasing the precision of parts manufacturing
9. Match the elements of the groups:

1. Low frequencies (LF)	a) 0.003 Hz – 30 kHz
2. High frequencies (HF)	b) 30 kHz – 30 MHz
3. Ultrahigh frequencies (UHF)	c) 30 MHz – 300 MHz

4. Superhigh frequencies (SHF) d) 300 MHz – 300 GHz

Correct answers: 1 – a); 2 – b); 3 – c); 4 – d)

10. Is the following statement correct?

A current of 200 mA is the threshold fibrillation current at industrial frequency. *(no, it is incorrect)*

4.1.3 Questions for testing FA3: "Ensuring Safety During the Threat and Occurrence of Emergencies and Military Conflicts. Countering Extremism and Terrorism"

1. Name the biological warfare (BW) agents intended for use against humans.

a) swine plague, equine encephalitis, glanders, melioidosis
b) plague, cholera, tularemia, anthrax, rust, smallpox
c) wheat rust, potato late blight, coffee rust

Correct answer: b) plague, cholera, tularemia, anthrax, rust, smallpox

2. If a person's clothing catches fire, what should be done first?

a) call an ambulance
b) call the fire department
c) try to extinguish the fire using available means (snow, water, outer clothing, etc.)
d) call for help from others and try to extinguish the fire together

Correct answer: d) call for help from others and try to extinguish the fire together

3. According to the degree of danger during an accident at a nuclear power plant (NPP), it is customary to divide the contaminated area into …… zones. *(6 zones)*

4. Accidents and catastrophes in transport are not classified as emergencies of a …… nature. *(natural)*

5. Complete the following statement:

Premises where flammable liquids that form flammable mixtures are stored, upon ignition of which the calculated overpressure develops up to 5 kPa, are classified as fire and explosion hazardous premises of category ……. *(B)*

6. When extinguishing a fire with fire extinguishers, it is necessary to maintain a safe distance of at least ……. *(1 m)*

7. Complete the definition:

Smoldering is ……. *(flameless combustion of material)*

8. The evaporation time of chemically hazardous substances (CHS) that have been freely spilled on the underlying surface depends on ……. *(the thickness of the layer)*

9. The maximum possible depth of transfer of air masses of chemically hazardous substances (CHS) is determined by the formula:

a) $\Gamma = \Gamma_1 + 0{,}5\Gamma_2$ b) $\Gamma = \Gamma'' + 0{,}5\Gamma'$ c) $\Gamma = N \cdot \nu$
d) $\Gamma = 0{,}5\Gamma'' + \Gamma'$ e) $\Gamma = \Gamma' - 0{,}5\Gamma''$

Correct answer: c) $\Gamma = N \cdot \nu$

10. Insert the required phrase into the following statement:

Solvent vapors belong to the class of combustible substances – ……. *(FL, flammable liquids)*

4.2 Examples of questions for the defense of laboratory works

Laboratory work "Investigation of industrial accidents"

Task for performing the laboratory work

1. Study the "Regulations on the specifics of investigating industrial accidents in certain industries and organizations" and prepare answers to the control questions.

2. Based on the available primary materials (explanatory notes and an extract from the personal briefing card), conduct an investigation of the accident and draw up a report according to Form N-1 (Appendix 1).

3. Review 7 accident scenarios and provide written answers: what are the causes of the accidents and whether they should be recorded as industrial accidents.

Control questions

1. Which accidents are classified as industrial accidents?
2. Which accidents are classified as accidents not related to production?
3. When is the investigation of an accident documented in a Form N-1 report?
4. Within what period is the enterprise administration required to issue the Form N-1 report to the victim?
5. Who at the enterprise is responsible for the proper and timely investigation of an accident?
6. What deadlines are established for the investigation of an accident?
7. Who may be part of the accident investigation commission?
8. Where are accidents recorded depending on the situation?
9. How many copies of the Form N-1 report are prepared during the investigation of an accident?
10. For how many years must the completed investigation reports according to Form N-1 be kept?

4.3 Examples of questions for practical classes

Practical work "Forecasting and assessing the situation during a chemical accident"

Task for performing the practical class

1. Determine the depth of the zone of possible contamination by the primary (secondary) cloud of a chemically hazardous substance (CHS).
2. Calculate the area of the contamination zone (CHS).
3. Determine the arrival time of the contaminated air to the facility.
4. Draw conclusions about the situation resulting from the chemical accident.

Option 1 (a, b). An accident occurred on a pressurized pipeline located at a distance of 7.5 km from the city. The amount of liquid leaking from the pipeline has not been determined. The technological system contained: a) 40 tons of liquefied chlorine; b) 120 tons of liquefied ammonia. It is required to determine the depth of the zone of possible contamination by chlorine (ammonia), the area of the contamination zone, and the arrival time of the contaminated air cloud to the city boundary, given that 1 hour has passed since the start of the accident, and the duration of the contamination source action is the evaporation time of chlorine (ammonia). Meteorological conditions at the time of the accident: wind speed 5 m/s, air temperature 0°C, isothermal conditions. The spill of CHS on the underlying surface is free.

Option 2 (a, b). Assess the danger of a chemical contamination source 1 hour after

a possible accident at a chemically hazardous facility located in the southern part of the city. The facility stores in a gas holder with a capacity of 2000 m^3: a) ammonia; b) chlorine. The pressure in the gas holder is atmospheric. Air temperature is 20°C. The northern boundary of the facility is located at a distance of 200 m from the potential accident site. This is followed by a 300-meter sanitary protection zone, beyond which residential areas are located. Determine the arrival time of the contaminated air cloud to the residential areas. Wind speed is 2 m/s, inversion conditions. The spill of CHS on the underlying surface is free.

Option 3 (a, b). Assess at what distance, 4 hours after the accident, the danger of population exposure in the chemical contamination zone will persist following the destruction of an isothermal storage facility: a) ammonia with a capacity of 30,000 tons; b) chlorine with a capacity of 10,000 tons. The height of the storage bund is 3.5 m. Air temperature is 20°C. Determine the area of the contamination zone and the arrival time of the contaminated air cloud to the boundary of a facility located at a distance of 10 km from the ammonia (chlorine) storage facility. Wind speed is 1 m/s, convection conditions.

Control questions

1. What is a chemically hazardous substance (CHS)?
2. What is meant by the CHS contamination zone?
3. What are the primary and secondary clouds of CHS?
4. What is meant by the equivalent quantity of CHS?
5. How is the duration of the damaging effect of CHS determined?
6. The degree of vertical stability of the air (atmosphere).

4.4 Essay Topics

1. Nanotechnology in the service of human health.
2. Occupational safety features for women and adolescents.
3. Forms of mental stress.
4. Psychophysiological foundations of occupational safety.
5. Problems of professional selection in the energy sector.
6. Psychophysiological causes of errors and the creation of dangerous situations.
7. Potential danger and risk. Methods for assessing dangerous situations.
8. "Fault tree." Hazard analysis. Safety criteria.
9. The automobile and ecology.
10. Healthy lifestyle.
11. Harmful habits: smoking, alcoholism, drug addiction, substance abuse.
12. Safe sex as an integral part of a healthy lifestyle.
13. Water – a source of longevity and a cause of premature death.
14. Stray currents. Causes and sources of occurrence.
15. Acid rain. Sources and causes of acid rain formation.
16. The impact of harmful substances (acids, alkalis, natural gas, fuel oil, coal, hydrogen, hydrazine hydrate, machine and transformer oils, slaked lime, iron sulfate, etc.) on the human body.
17. Analysis of hazardous and harmful factors of the domestic environment. Their impact on the human body.
18. Methods of protection from harmful and dangerous factors of the domestic environment.
19. The impact of the quality of consumer goods on human health. Consumer

Protection Law.
20. Optimization of indoor microclimate parameters. Air conditioning and ventilation.
21. The effect of thermal radiation on the human body.
22. Problems of industrial noise and vibration in the energy sector.
23. The impact of electromagnetic radiation on the human body.
24. Specific features of the impact of mobile communications on the human body (antennas, phones).
25. Safe operation of personal computers (PCs).
26. The impact of ionizing radiation on the human body.
27. Natural emergencies. Adaptation of production to conditions of natural emergencies.
28. Man-made emergencies.
29. Transport accidents (rail, road, water, aviation).
30. Methods of reducing road traffic injuries.
31. Terrorism – a threat to society.
32. Formation of children's readiness to act in dangerous and critical situations in modern society.

4.5 Questions for independent work of students

1. Hazard classification scheme.
2. Hazards of technical systems: failure, probability of failure. Safety criteria.
3. Labor Code of the Russian Federation. Section X "Occupational Safety", its content.
4. Compensation for harm caused to a victim as a result of an accident.
5. Benefits for employees working under harmful conditions.
6. Procedure for investigating industrial accidents, as well as their registration and recording.
7. Lighting parameters in human life activities.
8. Human capabilities for information processing.
9. Main fire protection measures.
10. Chemical monitoring devices.
11. Safe work with pressure vessels.
12. Factors influencing the stability of industrial facilities during emergencies.

4.6 Tasks for Interim Assessment

Basic Level

1. Concept of harmful and hazardous occupational factors.
2. Main legislative and regulatory documents on occupational safety.
3. State supervision and public control over compliance with occupational safety standards.
4. Liability of persons for violation of occupational safety requirements.
5. Investigation and recording of industrial accidents.
6. Air of the working area. Classification of harmful substances by degree and nature of impact on the human body.
7. Microclimate parameters of industrial premises.
8. Industrial noise. Basic physical characteristics of sound.
9. Vibration. Effect of vibration on the human body.
10. Types of industrial lighting.
11. Ionizing radiation. Effect on the human body. Means and methods of protection.
12. Effects of electric current on humans. Types of injuries.
13. Electrical safety measures.

14. Protective grounding (earthing), application example.
15. Neutral grounding (TN system), application example.
16. Residual current device (RCD): operating principle, main components, basic requirements for RCDs.
17. Classification of emergency situations (ES).
18. Natural disasters and calamities.
19. Fire safety (definition). Fire. Causes of fires at energy enterprises.
20. Classification of facilities by explosion and fire hazard.
21. Classification of zones by fire hazard.
22. Classification of zones and installations by explosion hazard.
23. Organization of fire protection at an enterprise.
24. Radiation accidents. Zones of radioactive contamination.
25. Chemical accident. Concept of the chemically hazardous substance (CHS) contamination zone.

Advanced Level

(The student must demonstrate knowledge of the Basic Level topics. The assessment additionally includes solving the following typical problems.)

Typical Problems

1. Based on the available primary materials (explanatory notes and an extract from the personal briefing card), conduct an investigation of the accident and draw up a report according to Form N-1.

2. Using the luminous flux utilization coefficient method, calculate the general lighting for a machine shop with a height of 6 m, length of 96 m, and width of 36 m.

3. Determine the current passing through the human body touching the housing of a damaged electrical installation due to insulation breakdown.

Insulation resistance – $r_1 = r_2 = r_3 = r_{ins}$ = 7.5 kOhm;
Human body resistance – R_h = 1.1 kOhm;
Voltage – U_{ph} = 660 V;
Protective grounding resistance – r_{grd} = 3 Ohm.

4. Determine the current flowing through the human body when touching one bare wire of a three-phase network:

a) with an isolated neutral;
b) with a grounded neutral.
Supply transformer voltage U = 380/220 V.
Human body resistance – R_h = 1 kOhm;
Floor resistance – R_{fl} = 1.4 kOhm;
Insulation resistance – $r_1 = r_2 = r_3 = r_{ins}$ = 500 kOhm;
Footwear resistance – R_{fw} = 1.5 kOhm.

5. A person touched one phase of a three-phase, three-wire network with a voltage of 380/220 V with an isolated neutral at a time when another phase was shorted to ground through a resistance. The phase-to-ground insulation resistance in normal operation is r1 = r2 = r3 = r_ins = 10,000 Ohm. The capacitances to ground are also equal: c1 = c2 = c3 = 0. Determine the current passing through the human body and the touch voltage.

Fault resistance r_{flt} = 100 Ohm;
Human body resistance R_h = 400 Ohm.

6. Assess at what distance, 4 hours after the accident, the danger to the population will remain in the chemical contamination zone following the destruction of an isothermal ammonia

storage facility with a capacity of 30,000 tons. The height of the storage bund is 3.5 m. Air temperature is 20°C. Determine the area of the contamination zone and the arrival time of the contaminated air cloud at the boundary of a facility located 10 km from the ammonia storage.

7. Determine the possibility of fire spreading from one stack of lumber to another, located parallel to each other at a distance of 10 m. Stack dimensions: length – 15 m, height – 2 m. Firefighting starts 10 minutes after ignition.

High Level

(The student must demonstrate knowledge of the Basic Level topics and the ability to solve complex problems. The assessment includes the same typical problems as for the Advanced Level, but with higher requirements for justification, analysis, and accuracy of calculations.)

Typical Problems

(The list of problems is identical to that of the Advanced Level. However, the evaluation criteria are more stringent: the student must provide a complete justification for each step, analyze possible assumptions, and evaluate the reliability of the obtained results.)