Ministry of Science and Higher Education of the Russian Federation

Federal State Autonomous Educational Institution of Higher Education
Perm National Research Polytechnic University

APPROVED BY
Pro-rector for Academic Affairs
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"11" 2021

ACADEMIC COURSE WORKING PROGRAM

Academic course: Life safety
(Name)

Form of education: Full-time
(Full-time /full-time - correspondence/correspondence)

Level of higher education: Bachelor's program
(Bachelor's program/specialist program/Master's program)

Workload in hours (in credits): 108 (3)
(Hours (CU))

Training program (degree): 15.03.06 Mechatronics and Robotics
(Code and denomination of degree)

Direction: Mechatronics and Robotics
(Title of curriculum)

Perm 2021

1. General Provisions

1.1. Goals and Objectives of the Course

The goal of the discipline is to gain knowledge about the normative and permissible levels of exposure to negative factors per person, study, classification and systematization of complex events, processes, phenomena in the field of ensuring safety and comfortable conditions for human activity, development of measures to anticipate, localize and eliminate existing threats and dangers.
The tasks of the discipline are reduced to:
- analysis and development of identification methods (recognition and quantification)
hazards, the sources of which are technical means, technological processes, materials, buildings and structures, elements of the technosphere, natural and social phenomena);
- development of principles and methods of protection against dangers, harmful and dangerous factors;
- development and rational use of means of protecting a person from negative the impact of man-made sources and natural phenomena, as well as the means to ensure comfortable conditions for human activity;
- development of measures to eliminate the consequences of the manifestation of hazards.

1.2. Studied Objects of the Course

The complex of phenomena and processes in the system "man - technology - environment", negatively affecting this system

1.3. Starting Conditions

Unstipulated

2. Planned Results of the Course Training

Competence	Indicator's Index	Planned Results of the Course Training (to know, be able to, to master)	Indicator of Attaining Competence which the planned results of training are correlated with	Means of Assessment
UC-8	**IA-1uc$_{-8.}$**	**To know** the level of requirements for creation and ensuring safe conditions of life activity; the code of behavior in cases of emergency situations	**Knows** the level of requirements to create and maintaining in everyday life and in professional safe conditions life activity; rules of conduct for threat and emergence emergencies	Test
UC-8	**IA-2uc$_{-8.}$**	**To be able to** create and ensure safe conditions for life activity; observe the safety codes in the process of research work and in the field of professional activity; can behave in case of emergency situations.	**Is able to** to create and maintain safe living conditions to preserve natural environment, providing sustainable development society; follow technical rules security at research and development and in	Laboratory report

			the area of professional activities; knows how to lead yourself when threatened and emergence emergencies	
UC-8	**IA-3uc$_{-8.}$**	**To master skills** of the safety measures in the process of professional activity; creation and observance of safe conditions for life activity; has the experience of behavior in conditions of emergency situations	**Masters the skills** of the security in everyday life and performing work in field of professional activities; creation and respecting safe conditions life activity; owns skills in action threat and in conditions emergencies	Laboratory report

3. Full time and forms of academic work

Form of academic work	Hours in all	Distribution in hours according to semesters		
		Number of semester		
		5		
1. Holding classes (including results monitoring) in the form: 1.1.Contact classwork, including:				
- lectures (L)	36	36		
- laboratory work (LW)	16	16		
- practice, seminars and/or other seminar-type work (PW)				
- control of self-work (CSW)	2	2		
- test				
1.2. Students' self-work (SSW)	54	54		
2. Intermediate attestation				
Exam				
Grading test	5	5		
Test (Credit)				
Course Project (CP)				
Course Work (CW)				
Workload in hours	**108**	**108**		

4. Course outline

Name of the units with the course outline	Full time of classroom activity in hours according to the forms			Full time of extracurricular work in hours according to the forms
	L	LW	PW	SSW
Semester 5				
Module 1. Theoretical basis of occupational safety and health Introduction to the discipline "OCCUPATIONAL SAFETY AND HEALTH". Basic terms and definitions. Tasks to ensure occupational health and safety. Society for Sustainable Development. Ensuring labor protection and industrial safety Concept and tasks of labor protection. Obligations of the employer and employee to ensure and comply with safe conditions and labor protection. The concept of a hazardous production facility. Industrial safety. Work safety culture. Bases of Standardization. The International Labor Organization (ILO). International Organization for Standardization (ISO). International cooperation in the field of security. The purpose and objectives of security. Legal and regulatory framework for security. Documents containing state regulatory requirements for labor protection. Occupational safety standards system. State safety authorities, their functions. Responsibility for violation of safety requirements.	4	-	-	14
Module 2. Occupational safety and health from harmful and (or) dangerous production factors, methods and means protecting the worker from them Microclimate. Heat transfer and the concept of heat balance. Microclimate concept. Principles of regulation and microclimate parameters. Assessment of working conditions. Methods and means of ensuring the requirements for the microclimate. Harmful substances and aerosols. Classification of harmful chemicals, aerosols, effects on the human body. Principles of regulation and parameters of harmful substances in the air of the working area. Hazard classes of harmful substances. Assessment of working conditions by indicators of the content of harmful chemicals. Methods and means of ensuring regulatory requirements for the air of the working area. Light environment. Shine. Lighting parameters. Characteristics of lighting quantities and units of measurement. Types and systems of industrial lighting. Natural, combined and artificial lighting, types, characteristics. Rationing principles and parameters light environment. Requirements for the light environment. Assessment of working conditions. Ensuring the requirements for the light environment,	32	16	-	40

lighting devices. Electromagnetic fields and radiation. General information about electromagnetic fields and radiation. Near and far zones of an electromagnetic wave, a plane electromagnetic wave. Principles of regulation and parameters of electromagnetic fields and radiation. Requirements for the parameters of electromagnetic fields and radiation (electrostatic field, constant magnetic field, electromagnetic field of industrial frequency, electromagnetic field of radio frequency). Assessment of working conditions by the parameters of electromagnetic radiation and fields. Methods and means of protection against electromagnetic fields and radiation.				
Noise. Sound. Physical characteristics of sound. Industrial noise, its sources, characteristics and noise classification. Addition of noise levels. Human exposure to noise. Noise level. Principles of noise levels. Equivalent noise level. Assessment of working conditions by noise parameters. Methods and means of protection against industrial noise. Vibration. Concept, characteristics and sources of vibration. The impact of vibration on the human body. Vibration classification. Principles of regulation and assessment of vibration impact. Frequency correction for general and local vibration. Assessment of working conditions by indicators of vibration impact. Methods and means of protection against vibration.				
Electrical safety. Electrical safety. Causes of Electric Shock. The effect of the current on the human body, factors affecting the outcome of the lesion. Basic measures to ensure electrical safety in the workplace. The main methods of first aid for victims of electric current. Ensuring safety during the operation of equipment. Hoisting mechanisms. Appointment, classification. The main hazards and conditions for their occurrence during the operation of lifting mechanisms. Basic safety measures when working with lifting mechanisms. Pressure equipment and systems. Operational and technological factors affecting the safe operation of pressure equipment. Basic measures to ensure the safety of pressure equipment. Fire safety. Fundamentals of the theory of combustion and explosion. Conditions and causes of fires. Methods and means of preventing fires. Classification fires and hazardous factors of fire. Fire safety equipment. Fire-fighting equipment. Conclusions. Social and legal responsibility for occupational health and safety. The purpose of the occupational health and safety management system. Cycle Plan-Do-Check-Act. Regulatory legal framework for labor protection. Risk-oriented				

competence. Civil (voluntary) and legal (compulsory) liability of the state, employers and workers.				
Total with regard to semester	36	16	54	108
Total with regard to the course	36	16	54	108

Topics of exemplary practical work

Sl.№	Topic of practical (seminar) work

Sl.№	Topic of laboratory work
1	Providing first aid to victims
	Study of microclimate parameters and protection from thermal radiation
	Research on the efficiency and quality of artificial lighting
	Research of methods and means of protection against noise
5	Study of microwave radiation and the effectiveness of protective shielding
6	Research of methods and means of protection against industrial vibration
7	Study of the effectiveness of protective grounding in electrical installations with voltage up to 1000 V

5. Organizational and Pedagogical Conditions

5.1. Educational Technologies Used for Competences Formation

Holding lectures in the discipline is based on the active method of training in the process of which students are not passive but active participants of the lesson answering questions of the teacher. Teacher's questions are aimed at activating the process of learning material as well as at the development of logical thinking. The questions stimulating associative thinking and connecting new material with the previous one are identified by the teacher in advance.

Laboratory classes are based on an interactive learning method in which students communicate not only with the teacher but also with each other. At the same time, students ' activity in the learning process dominates. The teacher's place in interactive classes is reduced to orienting students ' activities to achievement of the goals of studies.

Interactive lectures, group discussions, role-playing games, training sessions, and analysis of situations and simulation models are used in academic studies

5.2. Students' Manual for the Course Study

Learning the course students are recommended to fulfill the following positions:

1. Learning of the discipline should be done systematically.
2. After learning one of the course unit with the help of the text-book or lecture notes it is recommended to reproduce in memory the basic terms, definitions, notions of the unit.
3. Special attention should be paid to the reports on practical studies, laboratory works and individual complex tasks for self-work.
4. The topic of questions studied individually is given by the teacher at the lectures. Also the teacher refers to the literary resources (first of all, to the newly published in periodicals) in order the students understand the problems touched on the lectures in detail.

6. List of Teaching Materials and Information Supply for Students' Self work in the Discipline

6.1. Paper-based courseware

Sl.№	Bibliographic entry (author, title, mode of publication, place, publishing house, year of publication, number of pages)	Number of copies in the library
	1. Basic literature	
1	**Alli, Benjamin O.** Fundamental principles of occupational health and safety / Benjamin O. Alli. - Geneva : Intern. labour office, 2001. - IX, 154 c.; 24 см.; ISBN 92-2-110869-4	Internet
	2. Additional literature	
	2.1. Educational and scientific literature	
1	Paland N., Schwedes R. Occupational Safety and Health in Germany : An Overview. Bonn : Federal Min. of Labour & Social Affairs, 1991. 95 p.	3
	2.2. Standardized and Technical literature	
1	OHSAS 18001 «Occupational Health and Safety Management Systems — Specifications»	Internet
2	ISO 45001 "Occupational Health and Safety management systems"	Internet
	3. Students' manual in mastering discipline	
1	**Dolinina I.G.** Forming occupational safety culture on the basis of development of students' risk-focused intellection / I.G. Dolinina, O.V. Kushnaryova // International journal of environmental & science education 2016, vol. 11, no.14, 6323-6334 http://www.ijese.net/makale_indir/IJESE_944_article_57d4490c2eaab.pdf	Internet
2	Dolinina I.G. Engineering Education for Forming Students' Risk-Oriented Consciousness / Dolinina I.G., Geykhman L.K., Kushnaryova O.V., Kazarenkov V.I. // International Journal of Engineering & Technology, 7 (4.38) (2018) 118-121, URL: https://www.sciencepubco.com/index.php/ijet/article/view/24335	Internet
	4. Teaching and learning materials for students' self work	

6.2. Electronic Courseware

Kind of literature	Name of training tool	Reference to information resource	Accessibility of EBN (Internet/local net; authorized free assess)
Book	Exposure Science in the 21st Century: A Vision and a Strategy. Committee on Human and Environmental Exposure Science in the 21st Century; Board on Environmental Studies and Toxicology; Division on Earth and Life Studies; National Research Council. Washington (DC): National	https://www.ncbi.nlm.nih.gov/books/NBK206806/	Internet

	Academies Press (US); 2012 Sep 7.		
Book	On the buses: a mixed-method evaluation of the impact of free bus travel for young people on the public health. Green J, Steinbach R, Jones A, et al. Southampton (UK): NIHR Journals Library; 2014 Feb. (Public Health Research, No. 2.1.)	https://www.ncbi.nlm.nih.gov/books/NBK206806/	Internet

6.3. License and Free Distributed Software used in the Course Educational Process

Type of Software	Software branding
OS	Windows 10 (Azure Dev Tools for Teaching)
Office Applications	Adobe Acrobat Reader DC
Image processing software	Corel CorelDRAW Suite X4
General purpose application software	Mathematica Professional Version (license L3263-7820*)
General purpose application software	Microsoft Office Visio Professional 2016 (Azure Dev Tools for Teaching)
General purpose application software	WinRAR (license №879261.1493674)
Management systems for projects, research, development, design, modeling and implementation	Autodesk AutoCAD 2019 Education Multi-seat Stand-alone

6.4. Modern Professional Data bases and Inquiry Systems Used in the Course Educational Process

Branding	Reference to information resource
Scopus database	https://www.scopus.com/
Web of Science Database	https://www.webofscience.com/
Scientific electronic library database (eLIBRARY.RU)	https://elibrary.ru/
Scientific Library of the Perm National Research Polytechnic University	https://lib.pstu/
Lan Electronic Library System	https://e.lanbook.com/
Electronic library system IPRbooks	https://www.iprbookshop.ru/
Information resources of the Network ConsultantPlus	https://www.consultant.ru/
Company database EBSCO	https://www.ebsco.com/

7. Logistics of the Course Educational Process

Type of classes	Name of the necessary basic equipment	Number of units
Lecture audience	Multimedia complex consisting of: multimedia projector, acoustic system.	1
Laboratory work	Laboratory facilities: "First aid victims"; "Research of	1

	parameters microclimate and protection against thermal radiation"; "Research on efficiency and quality artificial lighting"; "Research of methods and means of protection against noise"; "Research of methods and means of protection against vibration"; "Research of microwave radiation and the effectiveness of protective shielding"; "Study of the effectiveness of the protective grounding in electrical installations with voltage up to 1000 V". Computer.	1

8. Fund of the Course Evaluating Tools
