Ministry of Science and Higher Education of the Russian Federation
Federal State Autonomous Institution of Higher Education
“National Research Nuclear University “MEPhI”

INSTITUTE OF ENGINEERING PHYSICS FOR BIOMEDICINE

APPROVED НТС ИФИБ

Protocol No. 3.1

dated 30.08.2024

# ACADEMIC COURSE OUTLINE

БЕЗОПАСНОСТЬ ЖИЗНЕДЕЯТЕЛЬНОСТИ / LIFE SAFETY

Educational program track (speciality) [1] 31.05.01 General Medicine

| **Semester** | **Labour input, credits** | **Total course academic, hours** | **Lectures, hrs.** | **Practical sessions, hrs.** | **Laboratory sessions, hrs.** | **In the form of practical studies, hrs.** | **Independent studies, hrs.** | **Independent studies monitoring, hrs.** | **Course progress, Exam/Pass-fail exam/Term** |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 2 | 72 | 16 | 16 | 0 | | 40 | 0 | PFE |
| Total | 2 | 72 | 16 | 16 | 0 | 0 | 40 | 0 | |

## ABSTRACT

When studying the discipline , the student learns: issues of safe human interaction with the environment in the human-technosphere system; organizational, managerial and technical means of protection during emergency situations (natural, man-made and social); the impact of damaging factors on humans during emergency situations; legal, regulatory-technical and organizational foundations of life safety; emergency response forces and means, structure and functions of civil defense and emergency response agencies.

As a result of mastering the discipline, an idea is formed about the inseparable unity of effective professional activity with the requirements for human safety, to master the methods of rationalizing life activities aimed at reducing anthropogenic impact on the natural environment and ensuring the safety of individuals and society, which ultimately consists in the ability to form a safety culture.


## 1. ACADEMIC COURSE GOALS AND OBJECTIVES

The main purpose of studying the discipline is the formation of a professional safety culture (noxological culture) among students, which means the willingness and ability of a person to use in professional activities the acquired set of knowledge, skills and abilities to ensure safety in the field of professional activity, the nature of thinking and value orientations, in which security issues are considered as a priority.

The result of mastering the academic discipline "Life safety" is the ability to analyze and build a safe behavior strategy in various situations, to know how to ensure the safety of life in the workplace and reduce the risks associated with human activities.; to master the methods of rationalization of life activities aimed at reducing anthropogenic impact on the natural environment and ensuring the safety of individuals and society, to form a culture of safety, environmental awareness and risk-oriented thinking, in which issues of safety and environmental conservation are considered as the most important priorities of human life.

## 2. PLACE OF THE ACADEMIC COURSE IN THE MAIN HIGHER EDUCATION CURRICULUM

The academic discipline is studied in the 3rd semester in the second year of study

The study of the discipline is based on the knowledge and skills acquired in the study of such disciplines as Chemistry, Medical and biological physics, Biology.

## 3. DEVELOPED COMPETENCIES AND INTENDED LEARNING OUTCOMES

Universal and/or general professional competencies:

| Competency code and title | Code and title of competency-based rubrics |
|---|---|
| УК-8 [1] – Capable of creating and maintaining safe living conditions in everyday life and professional activities to preserve the natural | З-УК-8 [1] – Know: - the main natural and man-made hazards, their properties and characteristics, the nature of the impact of harmful and hazardous factors on humans and the environment, methods of protection against them in relation to the sphere of |

| | |
|---|---|
| environment and ensure sustainable development of society, including in the event of the threat or occurrence of emergency situations and military conflicts. | their professional activity; - rules of conduct in the event of emergency situations of natural and man-made origin; - fundamentals of legislation in the field of sanitary and epidemiological well-being of the population, protection from emergency situations, and occupational safety; - methods of protection from dangers in the event of emergency situations during military operations or as a result of these actions.<br>У-УК-8 [1] – Be able to: - identify hazardous and harmful environmental factors within the context of ongoing activities, in emergency situations, and in military conflicts; - select methods of protection against hazards applicable to the scope of their professional activities and ways to ensure comfortable living conditions; - assess the sanitary and epidemiological situation in order to create and maintain safe living conditions.<br>В-УК-8 [1] – Possess the following skills: - use of personal and collective protective equipment; - provision of first aid to victims; - rationalization of professional activities in order to ensure safety and environmental protection. |

## 4. PEDAGOGIC POTENTIAL OF THE COURSE

| **Pedagogic tracks/objectives** | **Pedagogic goals (code)** |
|---|---|
| Environmental education | Establishing conditions for: fostering a respectful and caring attitude towards nature and the environment (B9) |

## 5. ACADEMIC COURSE STRUCTURE AND CONTENT

Academic course sections, their scope, terms of study and assessment:

| **No.** | **Academic course section name** | **Weeks** | **Lectures/ Practical (seminars)/ Laboratory sessions, hrs.** | **Compulsory current assessment (form*, week)** | **Maximum grade per section**** | **Section assessment (form*, week)** | **Competency-based rubrics** |
|---|---|---|---|---|---|---|---|
| | *3 Semester* | | | | | | |
| 1 | The first section | 1-8 | 8/8/0 | SA-8 (25) | 25 | SA-8 | З-УК-8, У-УК-8, В-УК-8 |
| 2 | The second section | 9-16 | 8/8/0 | SA-16 (25) | 25 | SA-16 | З-УК-8, У-УК-8, В-УК-8 |
| | *Totals for 3 Semester* | | 16/16/0 | | 50 | | |
| | **Assessment events for 3 Semester** | | | | 50 | PFE | З-УК-8, У-УК-8, |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | В-УК-8 |

* – abbreviated name of assessment

** – 100 maximum points per semester including a pass/fail exam and (or) an exam

Abbreviated current assessment forms and section assessment

| **Abbreviation** | **Full name** |
|---|---|
| SA | Summative assessment |
| PFE | Pass/fail examination |

## SYLLABUS

| **Weeks** | **Topics / Content** | **Lect., hrs.** | **Pr./sem., hrs.** | **Lab., hrs.** |
|---|---|---|---|---|
| | *3 Semester* | 16 | 16 | 0 |
| **1-8** | **The first section** | 8 | 8 | 0 |
| 1 | **Principles of building security systems.**<br>Theoretical foundations of life safety.<br>The concept of risk. The concept of danger. Potential danger. Forms of hazards. Individual and collective risk. Acceptable risk and the scheme of its definition. Motivated (justified) and unmotivated (unreasonable) risk. The Noxosphere. The Noosphere. The concept of Life Safety. | All | | |
| | | 2 | 2 | 0 |
| | | Online | | |
| | | 2<br>(EC, FtL, Prs) | 2<br>(EC, FtL, Prs) | 0 |
| 2 | **Health and its shaping factors**<br>Definition of "Health". Healthy lifestyle. Factors shaping health. Biological rhythms, classification. The concept of sleep. Sleep, age-related daily requirement. The diet. The doctrine of stress according to Selye. Physical activity and stress prevention. Physical inactivity and its consequences. The essence of various types of body hardening. Reproductive health and the effects of alcohol. Prevention of the use of psychoactive substances. Formation of an information security culture. | All | | |
| | | 2 | 2 | 0 |
| | | Online | | |
| | | 2<br>(Prs, EC, FtL) | 2<br>(EC, FtL, Prs) | 0 |
| 3 | **Human performance and its dynamics.**<br>Labor protection legislation. Main regulatory documents: Federal Laws, articles, sanitary and hygienic standards.<br>Mental and physical labor, physiological foundations. Ways to increase the efficiency of human labor activity. Work and rest regime. The norms of rest time, depending on the nature of the work. The concept of workability. Phases of working capacity (mobilization, relaxation or hypercompensation, sustained working capacity or compensation, fatigue or decompensation, increased productivity, progressive decrease in working capacity, recovery period | All | | |
| | | 0 | 0 | 0 |
| | | Online | | |
| | | 2<br>(EC, FtL, Prs) | 2<br>(EC, FtL, Prs) | 0 |
| 4 | **Indoor microclimate and its main parameters and** | All | | |

| | | | | |
|---|---|---|---|---|
| | **standards.**<br>Classification of microclimate parameters (optimal, acceptable). Physical (temperature, illumination, air velocity, relative humidity, electromagnetic radiation, etc. "SanPiN 2.2.4.548-96. 2.2.4.), chemical (aeroionic composition of air SanPiN 2.2.4.1294-03), biological. Protective measures. Time protection. Estimation of microclimate parameters. Hygienic requirements for the assessment of working conditions in the investigation of occupational diseases. | 0 | 0 | 0 |
| | | Online | | |
| | | 2<br>(EC, FtL, Prs) | 2<br>(EC, FtL, Prs) | 0 |
| **9-16** | **The second section** | 8 | 8 | 0 |
| 5 | **Life safety in emergency situations.**<br>The concept of an emergency. Natural emergencies. The concept of an emergency. The concept of an accident, disaster, emergency. Emergency zone. The disaster area. Classification by nature of occurrence (natural, man-made, ecological, biological, social), by reason of occurrence (unintentional and intentional), by regime (peacetime and wartime), by speed of development (sudden, rapid, moderate). Qualitative and quantitative criteria for assessing emergencies: temporary (suddenness and rapidity of events); socio-ecological (human casualties, material damage – its classification), socio-psychological. Emergency conditions (the presence of a risk source, the effect of a risk factor, the presence of people, farm animals and land in the affected area). Emergency information transmission procedure. Emergency prevention measures, public notification, evacuation organization, elimination of consequences, damage assessment. The tasks of the object commissions for emergencies, which are established in organizations, enterprises, institutions. Training of the population in the field of emergency protection (education, training, promotion of knowledge). Supervision, control and responsibility for violations of legislation in the field of protection of the population and territories from emergencies. Natural sources of emergencies. Types: geological and geophysical (earthquakes, volcanic eruptions, landslides, mudslides, avalanches, dust storms, etc.); hydrometeorological (cyclones, tsunamis, storms, floods, etc.); meteorological (hurricanes, storms, tornadoes, heavy rains, snowfalls, etc.); biological sources (especially dangerous infectious diseases and mass poisoning of people - epidemics, infectious diseases of farm animals and plants - epizootics and epiphytotics, mass spread of pests, etc.). | All | | |
| | | 0 | 0 | 0 |
| | | Online | | |
| | | 2<br>(EC, FtL, Prs) | 2<br>(EC, FtL, Prs) | 0 |
| 6 | **Technogenic emergencies.**<br>Classification of man-made emergencies by scale (local, local, territorial, regional, interregional, federal, global). Classification by origin of emergencies | All | | |
| | | 0 | 0 | 0 |
| | | Online | | |
| | | 2 | 2 | 0 |

| | | | | |
|---|---|---|---|---|
| | related to: various modes of transport (air, rail, automobile, water, underground), fires and explosions, chemical emissions, emissions of radioactive substances, biologically hazardous substances, at municipal enterprises). Analysis of causes and prevention of emergencies. A social emergency. | (EC, FtL, Prs) | (EC, FtL, Prs) | |
| 7 | **Basic principles and methods of ensuring public safety in emergency situations.**<br>The concept of the damaging factor, character and parameters. The effect of electromagnetic fields and (non-ionizing) radiation on humans. Ionizing radiation and radiation safety assurance. Electric current and its effect on humans.<br>Personal protective equipment (PPE) (Art. 221 of the Labor Code of the Russian Federation). Groups and purpose of PPE (insulating suits, special protective clothing, respiratory, eye, face, hearing protection, hand and foot protection, fall protection, dermatological protective equipment). Ministry of Health and Social Development of the Russian Federation "Intersectoral rules for the provision of PPE workers" dated 06/01/2009 N 290n; GOST 12.4.011-89 "Occupational Safety Standards System (SSBT). Protective equipment for employees. General requirements and classification".<br>Means of collective protection (CKS). Classification of the SCZ. Types of SCR (means of normalizing the air environment of industrial premises and workplaces, protection from elevated levels of electromagnetic, ionizing, infrared,<br>Investigation and accounting of industrial accidents. Occupational diseases. | All | | |
| | | 0 | 0 | 0 |
| | | Online | | |
| | | 2 (EC, FtL, Prs) | 2 (EC, FtL, Prs) | 0 |
| 8 | **International cooperation in the field of life safe-ty and environmental protection.**<br>The World Conservation Union (IUCN), 1948 (Gland, Switzerland).<br>International Atomic Energy Agency (IAEA, 173 Member States), 1957, UN. The headquarters is in Vienna, Austria.<br>World Health Organization (WHO, 198 Member States), 1948, Geneva, Switzerland.<br>Organization for the Prohibition of Chemical Weapons (OPCW, 191 participating countries), 1997, The Hague (Netherlands).<br>International Civil Defense Organization (IGO), 1932. Headquarters in Geneva, Switzerland.<br>Department of the United Nations Coordinator for Disaster Relief (UNDRO), 1971<br>The Intergovernmental Oceanographic Commission (IOC) was established under the auspices of the UNSC in 1960, Paris, France. | All | | |
| | | 0 | 0 | 0 |
| | | Online | | |
| | | 2 (EC, FtL, Prs) | 2 (EC, FtL, Prs) | 0 |

| | | | | |
|---|---|---|---|---|
| | World Meteorological Organization (WMO, 139 member countries of the project), 1951, Geneva, Switzerland.<br>International public organization "Greenpeace", 1971, Amsterdam, the Netherlands.<br>World Wildlife Fund (WWF), 1961, Gland, Switzerland. | | | |

Abbreviated names of online options:

| **Abbreviation** | **Full name** |
|---|---|
| EC | E-course |
| FtM | Full-text material |
| FtL | Full-text lectures |
| VM | Video materials |
| AM | Audio materials |
| Prs | Presentations |
| T | Tests |
| ERM | E-reference materials |
| IS | Interactive site |

PRACTICAL SESSIONS TOPICS

| **Weeks** | **Topics / Content** |
|---|---|
| | *3 Semester* |
| 1 | **Man and the technosphere.**<br>Noxosphere. Noosphere. Life safety concept.<br>Basic concepts and conditions of safety<br>Hazard and risk concept. |
| 2 | **Factors shaping human health.**<br>Biological rhythms, classification. Sleep concept. Sleep, age-related daily requirement. Diet. Selye's doctrine of stress. Physical activity and stress pre-vention. Physical inactivity and its consequences. The essence of various types of hardening of the body. Reproductive health and the effects of alco-hol. Prevention of psychoactive substance use. Building a culture of information security. |
| 3 | **The concept of maximum permissible concentrations, levels.**<br>Hygienic standards of working conditions. Understanding of the maximum permissible concentrations, levels. Classification of harmful substances into 4 hazard classes (extremely dangerous, highly dangerous, moderately dangerous, and minimally dangerous) and effects on the human body. Workplace (Convention No. 155 of the International Labour Organization "On Occupational Safety and Health and the Working Environment", Geneva, 06/22/1981).<br>SanPiN 2.1.3684-21 "Sanitary and epidemiological requirements for ... water facilities, drinking water and drinking water supply to the population, atmospheric air, soils, residential premises, operation of industrial and public premises, organization and conduct of sanitary and anti-epidemic (preventive) measures". |
| 4 | **Microclimate parameters. Workplace.**<br>Microclimate parameters. Workplace SanPiN 1.2.3685-21 "Hygienic standards and requirements for ensuring the safety and (or) harmlessness of environmental factors for humans" - requirements for the microclimate of industrial premises to prevent the adverse effects of the microclimate of workplaces, industrial premises on human well-being, |

| | |
|---|---|
| | functional condition, efficiency and health. Classification of microclimate parameters (optimal, acceptable). |
| 5 | **Qualitative and quantitative criteria for assessing emergencies.**<br>Emergency prevention measures, public notification, evacuation organization, elimination of consequences, damage assessment. The tasks of the object commissions on emergency situations created in organizations, enterprises, institutions. Training of the population in the field of emergency protection (education, training, promotion of knowledge). Supervision, control and responsibility for violations of legislation in the field of protection of the population and territories from emergencies. |
| 6 | **Natural emergencies. Natural sources of emergencies.**<br>Types: geological and geophysical (earthquakes, volcanic eruptions, landslides, mudslides, avalanches, dust storms, etc.); hydrometeorological (cyclones, tsunamis, storms, floods, etc.); meteorological (hurricanes, storms, tornadoes, heavy rains, snowfalls, etc.); biological sources (especially dangerous infectious diseases and mass poisoning of people - epidemics), epizootics and epiphytotics, mass spread of pests, etc. |
| 7 | **Emergencies of a technogenic and social nature.**<br>Man-made and social emergencies. Classification by origin of emergencies related to: various modes of transport (air, rail, automobile, water, underground), fires and explosions, emissions of chemicals, emissions of radioactive substances, biologically hazardous substances, at municipal enterprises). Analysis of causes and prevention of emergencies |
| 8 | **International cooperation in the field of life safety and environmental protection.**<br>World Conservation Union (IUCN), 1948 (Gland, Switzerland).<br>International Atomic Energy Agency (IAEA, 173 Member States), 1957 UN. Headquarters in Vienna, Austria.<br>World Health Organization (WHO, 198 Member States), 1948 Geneva, Switzerland.<br>Organization for the Prohibition of Chemical Weapons (OPCW, 191 Member States), 1997 The Hague (Netherlands).<br>International Civil Defense Organization (IOGO), 1932. Headquarters in Geneva, Switzerland.<br>United Nations Disaster Relief Coordinator's Of-fice (UNDRO), 1971<br>The Intergovernmental Oceanographic Commission (IOC) was established under the auspices of UNESCO in 1960, Paris, France.<br>World Meteorological Organization (WMO, 139 countries-members of the project), 1951, Geneva, Switzerland.<br>International public organization "Greenpeace", 1971, Amsterdam, the Netherlands.<br>World Wildlife Fund (WWF), 1961, Gland, Swit-zerland.<br>Global Environment Facility (GEF), 1991<br>International Reference System for Sources of En-vironmental Information (INFOTERRA). |

## 6. EDUCATIONAL TECHNOLOGIES

When studying the discipline, along with traditional teaching technologies, the use of interactive forms of classes is envisaged.

Surveys are conducted on the topics under consideration.

Students participate in the discussion, ask each other questions.

The educational process can also be organized using distance learning technologies.

The development of academic discipline in full-time education using distance learning technologies occurs according to the following scheme.

The educational and methodological materials necessary for training are posted in the University's distance learning system, the Educational Portal (online.MEPhI, EP) of the National Research Nuclear University "MEPhI".

Each student receives a username and password to log in to the EP for the entire period of mastering the educational program.

The learning process is based on the remote interaction of students, teachers and using e-mail and audio and video communication.

According to the academic schedule, the student gets access to electronic educational materials. The teaching materials are presented in the form of hypertext textbooks, which include theoretical material, examples of standard tasks in the discipline, tasks /assignments for independent performance (which must be completed and sent to the teacher for review, according to the discipline's study schedule) and materials for ongoing monitoring and self-monitoring.

The interaction of students and teachers on all academic issues (sending written papers, questions and answers concerning the discipline, etc.) is carried out directly from students to the teacher and back through the Educational Portal of the National Research Nuclear University MEPhI.

## 7. ASSESSMENT TOOLKIT

The assessment toolkit ensures verification of the intended learning outcomes achievement (competency-based rubrics) using current, midterm and interim assessment of the course.

The link between developed competencies and their assessment is presented in the following table:

| **Competency** | **Achievement rubrics** | **Assessment activity (Syl 1)** |
|---|---|---|
| УК-8 | З-УК-8 | PFE, SA-8, SA-16, КИ-8, КИ-16 |
| | У-УК-8 | PFE, SA-8, SA-16, КИ-8, КИ-16 |
| | В-УК-8 | PFE, SA-8, SA-16, КИ-8, КИ-16 |

### Educational achievement rubrics scales

The scale of each assessment activity varies from 0 to the maximum established point, inclusive. The final assessment of the course is performed on a 100-point scale and represents the sum of the points earned by the student in the section assessments, framework of current and interim assessment.

Sections and interim assessments are considered passed when the student achieves a minimum score equal to 60% of the maximum. The final grade is assigned only upon passing all sections and the interim assessment.

The final grade is assigned in accordance with the following scale:

| **Total score** | **Rating on a 4-point scale** | **Pass/fail examination** | **ECTS assessment** |
|---|---|---|---|
| 90-100 | 5 – *«excellent»* | *«pass»* | A |
| 85-89 | 4 – «*good*» | | B |
| 75-84 | | | C |

| | | | |
|---|---|---|---|
| 70-74 | | | D |
| 65-69 | 3 – «*satisfactory*» | | |
| 60-64 | | | E |
| below 60 | 2 – «*fail*» | *«fail»* | F |

An “excellent” grade indicates a deep and solid mastery of the program material by a student who presents their answers consistently, clearly, and logically, is able to closely link theory with practice, and uses materials from monographic literature in their answers.

A “good” grade corresponds to a student’s solid knowledge of the material, who presents their answers competently and to the point, without any significant inaccuracies.

A “satisfactory” grade corresponds to the basic level of mastery of the material by the student, in which the main material has been mastered, but its details have not been assimilated, the answers contain inaccuracies, insufficiently correct wording and logical inconsistencies.

A grade “pass” corresponds to at least a basic level of mastery of the program material, in which the student possesses the necessary knowledge, skills, and abilities, and is able to apply theoretical principles to solve typical practical problems.

A grade “fail” is given to a student who lacks a significant understanding of the curriculum material, makes significant errors in their answers, or fails all required assignments. These students are generally unable to continue their studies without additional classes.

## 8. ACADEMIC COURSE EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT

CORE READING:

1. ЭИ Б40 Life Safety in Medicine : учебное пособие, Levchuk I.P., Москва: ГЭОТАР-Медиа, 2021

FURTHER READING:

1. 33 Б40 Безопасность технологических процессов и производств. Охрана труда : Учеб. пособие для вузов, , М.: Высш. школа, 2001

2. ЭИ Х12 Комментарии к нормам труда в здравоохранении: новые приказы - старые проблемы : монография, Берсенева Е.А., Хабриев Р.У., Шипова В.М., Москва: ГЭОТАР-Медиа, 2019

3. ЭИ М 42 Медицина катастроф. Курс лекций : Рекомендовано ГОУ ВПО "Московская медицинская академия им. И.М. Сеченова" в качестве учебного пособия для студентов учреждений высшего профессионального образования, обучающихся по специальностям 060101.65 "Лечебное дело", 060103.65 "Педиатрия", 060105.65 "Медико-профилактическое дело", 060601.65 "Медицинская биохимия", 060602.65 "Медицинская биофизика", 0606609.65 "Медицинская кибернетика", 060201.65 "Стоматология", 060301.65 "Фармация", 060500.65 "Сестринское дело" по дисциплине "Медицина катастроф", "Безопасность жизнедеятельности и медицина катастроф" и "Экстремальная и военная медицина"., , Москва: ГЭОТАР-Медиа, 2013

4. 50 Б 43 Ноксология : учебник и практикум для академического бакалавриата, Белов С. В., Симакова Е. Н., Москва: Юрайт, 2018

5. 50 Э40 Экология и безопасность жизнедеятельности : Учеб. пособие для вузов, , М.: ЮНИТИ, 2000

SOFTWARE:

No special softwares is required

LMS AND ONLINE RESOURCES

https://online.mephi.ru/

http://library.mephi.ru/

## 9. LOGISTICAL SUPPORT

1. Персональный компьютер: Процессор CPU Intel Core i7-8700 (3.2GHz/12MB/6 cores) Материнская плата Gig (64-306)

2. Мышь, клавиатура (64-306)

3. Аппарат для электрофизиологических исследований MP35 (Biopac Student Lab, полная комплектация для PC (64-306)

4. «Интерактивный анатомический стол «Пирогов I» с программным обеспечением «3D атлас нормальной и топо (64-403)

5. Демонстрационные модели сердечно-сосудистой системы (64-403)

6. Демонстрационные модели дыхательной системы (64-402)

7. Мышь, клавиатура (64-303)

8. Интерактивная доска SMART SBM 685 (64-303)

9. Проектор SMART P109 (64-303)

10. Мебель лабораторная, стулья, шкафы для хранения (64-303)

11. Бинокулярные микроскопы "Микромед 2" (64-303)

12. Тринокулярный микроскоп "Микромед-3" (64-303)

13. Видеоокуляр ToupCam 5,1 MP (64-303)

14. Бинокулярные микроскопы "Микромед 2" (64-305)

15. Монитор Dell P2720D (64-306)

16. Видеокамера Microsoft LifeCam Cinema HD (64-306)

17. Дозиметр ЭКОМЕДИКА AIR-02 (64-303)

18. Цифровой шумомер с функцией регистратора МЕГЕОН 92131 (64-303)

19. Люксметр RGK LM-20 (64-303)

20. Многокомпонентный газоанализатор МАГ-6 С (O2, CO2, CO, NH3, H2S) (64-303)

## 10. EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS FOR STUDENTS

Practical classes on the course are aimed at equipping future specialists with theoretical knowledge and practical skills on safe living in production, at home and in emergency situations of man-made and natural origin, as well as obtaining fundamental knowledge on forecasting and modeling the consequences of industrial accidents and catastrophes, the development of technical means and methods of environmental protection.

The completion of the entire seminar cycle is a prerequisite for the student's admission to the test.

The student must conduct active cognitive work, which consists in mastering knowledge, skills and abilities in the field of legal, regulatory, technical and organizational foundations of life safety, rational conditions of human activity; damaging factors of natural disasters, major industrial accidents and catastrophes, modern means of destruction, harmful and dangerous industrial factors.

Practical classes (seminars).

The conceptual framework of the discipline "Life safety". The definition of danger (risk) and the general structural scheme of its implementation.

The taxonomy of risks and their nature.

The natural landscape. Sound and noise. Environmental pollution. The impact of water resources on human life. Soil and man. Weather and human well-being. Meteorological pathology. A man in extreme conditions. Human risks. Changing the characteristics of a person that determine the possibilities of his successful (safe) activity. Mental stress in human work. Ensuring a person's mental reliability in the process of work. Control of a person's mental state during work.

Fire-fighting instruction and fire-technical minimum. General requirements of fire safety in industrial enterprises. Fire extinguishing equipment, fire fighting equipment and inventory. Actions of the population in case of fire and explosions.

Man-made risks. Radiation hazard. Accidents involving the release of highly toxic substances. Fires and explosions. Accidents on railway transport. Accidents in the subway. Accidents on motor transport. Accidents on sea and river transport. Accidents in aviation transport.

Natural risks. Earthquake. Landslides, mudslides and landslides. Hurricanes, storms and tornadoes. Tsunami. Floods. Avalanches and snowstorms. Drought and extreme heat. Forest and peat fires. Infectious diseases.

The main recommendations of a behavioral nature in the threat and implementation of terrorist acts, during hostage-taking. Providing first aid.

When implementing the discipline "Life Safety", lectures and practical exercises are conducted according to the discipline's work program, and hours are allocated for students to work independently on in-depth consideration of individual sections of the discipline.

Lectures are conducted using presentations. The lecture course on the discipline is designed to provide students with an indicative basis for further learning of the material through independent work.

The content of the discipline meets the following didactic requirements:

• presentation of the material from simple to complex, from known to unknown;

• logical, precise and clear presentation of the material;

• the possibility of problematic presentation, discussion, dialogue in order to activate the student's activity;

• close connection of theoretical provisions and conclusions with the practice and future professional activity of students.

Practical classes of the course are conducted on the key and most important topics, sections of the curriculum. They are based on both the material of one lecture and the content of several lectures.

When studying the discipline, the use of interactive forms of classes is provided. Surveys are conducted on the topics under consideration. Students participate in the discussion, ask each other questions.

Guidelines for writing an abstract/presentations.

The preparation of abstracts is aimed at developing and consolidating students' skills of independent in-depth, creative and comprehensive analysis of educational, scientific and other literature on topical issues of the discipline; at developing skills and abilities to present the material competently and convincingly, clearly formulate theoretical generalizations, conclusions and practical recommendations.

Abstracts must meet the following requirements:

1. The volume of the abstract is 12-15 pages of text or 10 slides of presentation maximum (the list of references and appendices are not included in the volume).

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Methodological support of innovative forms of educational activities

1. Training is a form of active learning, the purpose of which is to transfer knowledge, develop the competence of professional activities to ensure safe living in the proposed situations.

Within the framework of the training, conditions are created for the independent search for ways to solve the tasks set in the field of ensuring safe human life in various conditions.

2. Analysis of specific situations (CASE-STUDY) is an effective method of activating the educational and cognitive activity of students. A case is a description of a real situation or a "snapshot of reality", a "photograph of reality".

There are several types of situations:

A problem situation is a description of a real problem situation.

The goal of the trainees is to find a solution to the situation or to come to the conclusion that it is impossible.

The situation assessment describes a situation from which a way out has already been found.

The purpose of the trainees is to conduct a critical analysis of the decisions made, to give a reasoned conclusion about the presented situation and its solution.

The situation – the illustration represents the situation and explains the reasons for its occurrence, describes the procedure for its solution. The purpose of the trainees is to assess the situation as a whole, analyze its solution, formulate questions, and express agreement or disagreement.

The preemptive situation describes the application of previously adopted decisions, and therefore the situation is of a training nature, serving as an illustration of a particular topic. The purpose of the trainees is to analyze the given situations, the solutions found, using the acquired theoretical knowledge.

A case may contain a description of one event in one organization or the history of the development of many organizations over many years.

Presentation requirements for the CASE:

- meet a clearly defined creation goal;
- have an appropriate difficulty level;
- illustrate several aspects of real life;
- do not become obsolete too quickly;
- illustrate typical situations;
- develop analytical thinking;
- discussion.

The CASE-STUDY method assumes that the teacher leads the discussion of the problem presented in the case, and the solutions themselves can be presented to students in a variety of ways: print, video, audio, multimedia.

Methodological recommendations on the organization of the educational process using distance learning technologies.

The development of academic discipline in full-time education using distance learning technologies occurs according to the following scheme:

The educational and methodological materials necessary for training are posted in the University's distance learning system, the Educational Portal (online.MEPhI, EP) of the National Research Nuclear University "MEPhI".

Each student receives a username and password to log in to the OP for the entire period of mastering the educational program.

The learning process is based on the remote interaction of students, teachers and using e-mail and audio and video communication.

According to the academic schedule, the student gets access to electronic educational materials. The teaching materials are presented in the form of hypertext textbooks, which include theoretical material, examples of standard tasks in the discipline, tasks /assignments for independent performance (which must be completed and sent to the teacher for review, according to the discipline's study schedule) and materials for ongoing monitoring and self-monitoring.

The interaction of students and teachers on all academic issues (sending written papers, questions and answers related to the discipline, etc.) is carried out directly from students to the teacher and back through the online.MEPhI Educational Portal.

## 11. EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS FOR TEACHERS

When implementing the discipline, lectures and practical exercises are conducted according to the discipline's work program, and hours are allocated for students to work independently on in-depth consideration of individual sections of the discipline.

Lectures are conducted using presentations (MS Power Point). The lecture course on the discipline is designed to provide students with an indicative basis for further learning of the material through independent work.

The content of the discipline meets the following didactic requirements:

• presentation of the material from simple to complex, from known to unknown;

• logical, precise and clear presentation of the material;

• the possibility of problematic presentation, discussion, dialogue in order to activate the student's activity;

• close connection of theoretical provisions and conclusions with the practice and future professional activity of students.

Practical classes of the course are conducted on the key and most important topics, sections of the curriculum. They are based on both the material of one lecture and the content of several lectures.

When studying the discipline, the use of interactive forms of classes is provided. Surveys are conducted on the topics under consideration. Students participate in the discussion, ask each other questions.

Practical lesson plans.

The curriculum provides for the following seminars on the issues of the course "Life Safety".

Seminar topics:

1. Man and the technosphere.
2. Factors shaping human health.
3. The concept of maximum permissible concentrations, levels.
4. Microclimate parameters. Workplace.
5. Qualitative and quantitative criteria for assessing emergencies.
6. Natural emergencies.
7. Man-made and social emergencies.
8. International cooperation in the field of life safety and environmental protection.

The following standard lesson plan is recommended for teachers.

Monitoring the completion of the previous assignment for an independent decision on the topic of the previous lesson

1. Introductory remarks by the teacher on the topic of the current lesson.

2. Formulation of a theoretical question for discussion by students (previously, the student receives a topic on which it is necessary to prepare a report in the form of a presentation according to the requirements: regulations, disclosure of the topic content, structuring).

3. Hearing reports with mandatory discussion.

4. Summarizing the lesson results, announcing grades to students who made presentations or actively participated in the consideration of class issues.

5. For the period until the next seminar session, students are given an assignment for independent work. It consists of an in-depth study of the topic of the educational material presented in previous lectures.

Guidelines for writing an abstract/presentation.

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