

INSTITUTE OF ENGINEERING PHYSICS FOR BIOMEDICINE

APPROVED ИТС ИФИБ

Protocol No. 3.1

dated 30.08.2024

ACADEMIC COURSE OUTLINE

МЕДИЦИНА ЧРЕЗВЫЧАЙНЫХ СИТУАЦИЙ / DISASTER MEDICINE

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
12	3	108	20	40	0		48	0	PFE
Total	3	108	20	40	0	40	48	0	

ABSTRACT

Developing students' readiness and ability to work in emergency situations during peacetime and wartime, and to participate in the elimination of medical and sanitary consequences of emergency situations

1. ACADEMIC COURSE GOALS AND OBJECTIVES

The purpose of mastering the discipline is to develop in students the readiness and ability to work in emergency situations of peacetime and wartime, to participate in the elimination of the medical and sanitary consequences of emergency situations.

The objectives of this course are:

- to develop a system of knowledge about emergency situations in peacetime and wartime, the purpose and structure of the Unified State System for the Prevention and Elimination of Consequences of Emergencies and the All-Russian Disaster Medicine Service;
- to develop the ability to assess problems and risks associated with human life safety and foster a culture of safe behavior;
- to develop practical skills in providing first aid, primary pre-medical care, and primary medical care to victims in various emergency situations and accidents;
- to develop organizational skills and develop knowledge to justify decisions regarding the provision of medical care to victims in emergency situations;
- to develop the ability to organize measures to protect the population from natural and man-made hazards;
- to develop motivation and abilities for independently improving knowledge in life safety and disaster medicine.

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

Study of this course is preceded by the study of the following disciplines: internal medicine (faculty and hospital courses), surgical diseases (faculty and hospital courses), and other clinical disciplines and practices.

The knowledge, skills, abilities, and practical experience acquired in this course are essential for successful professional work.

3. DEVELOPED COMPETENCIES AND INTENDED LEARNING OUTCOMES

Universal and/or general professional competencies:

Competency code and title	Code and title of competency-based rubrics
YK-8 [1] – Capable of creating and maintaining safe living conditions in everyday life and professional activities to preserve the natural environment and ensure sustainable	3-YK-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 their professional activity; - rules of conduct in the event of

<p>development of society, including in the event of the threat or occurrence of emergency situations and military conflicts.</p>	<p>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. Y-YK-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. B-YK-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.</p>
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Professional competencies in compliance with the goals and professional knowledge areas:

Professional activity goal	Professional activity knowledge area	Professional competency code and title; Based on the professional standard, experience analysis	Code and title of competency-based rubrics
medical			
<p>Providing medical care to patients in urgent and emergency forms.</p>	<p>Individuals (patients); the population; the set of means and technologies aimed at creating conditions for preserving and strengthening the health of the adult population</p>	<p>IIK-3.1 [1] - Able to provide medical care to patients in urgent or emergency forms <i>The base:</i> Professional standard: 02.009</p>	<p>3-IIK-3.1[1] - Know: - clinical signs of sudden cessation of breathing, circulation, loss of consciousness, life-threatening mental disorders for the patient or others; - indications for external defibrillation; - principles of external electro-impulse therapy (defibrillation) devices and rules for performing external defibrillation; - rules for performing basic cardiopulmonary resuscitation.; Y-IIK-3.1[1] - Be able to: - recognize conditions (sudden acute illnesses, exacerbations of chronic diseases) requiring medical care in urgent or emergency forms; -</p>

	<i>12 Semester</i>						
1	The First section	1-8	10/20/0		25	S-8	3-ПК-3.1, У-ПК-3.1, Б-ПК-3.1, 3-УК-8, У-УК-8, Б-УК-8
2	The Second section	9-15	10/20/0		25	Task-15	3-ПК-3.1, У-ПК-3.1, Б-ПК-3.1, 3-УК-8, У-УК-8, Б-УК-8
	<i>Totals for 12 Semester</i>		20/40/0		50		
	Assessment events for 12 Semester				50	PFE	3-ПК-3.1, У-ПК-3.1, Б-ПК-3.1, 3-УК-8, У-УК-8, Б-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
S	Summary
Task	Task
PFE	Pass/fail examination

SYLLABUS

Weeks	Topics / Content	Lect., hrs.	Pr./sem., hrs.	Lab., hrs.
	<i>12 Semester</i>	20	40	0
1-8	The First section	10	20	0
1 - 4	Medical, sanitary and medical psychological support for the population and rescuers in Emergency situations Fundamentals of medical and evacuation support for the population in emergency situations of peacetime and wartime Specific aspects of medical and sanitary support for the population during the aftermath of natural and man-made emergencies and terrorist attacks. Sanitary and anti-epidemic (preventive) measures in the aftermath of Emergency situations. Preparation and organization of work of medical and preventive institutions in Emergency situations. Organization of medical supplies in emergency situations Fundamentals of organizing medical and psychological support for the population and rescuers in Emergency situations.	All		
		5	10	0
		Online		
		0	0	0

5 - 8	Emergency Toxicology Introduction to Emergency Toxicology Toxic Chemical Nerve Agents. Toxic chemicals, predominantly cytotoxic. Toxic chemicals are mainly of general toxic action. Toxic chemicals with predominantly pulmonary toxic effects Psychotropic substances (incapacitants) Toxic technical liquids Standard oxygen equipment and artificial respiration devices used in emergency situations.	All		
		5	10	0
		Online		
		0	0	0
9-15	The Second section	10	20	0
9 - 11	Radiology Introduction to Emergency Radiology. General characteristics of radiation injuries resulting from nuclear explosions and radiation accidents	All		
		4	8	0
		Online		
		0	0	0
12 - 15	Medical protection Personal and collective protective equipment. Medical means for the prevention and provision of assistance in case of chemical and radiation injuries. Means and methods of chemical reconnaissance and control Organization and implementation of radiation reconnaissance and control Organization and implementation of special treatment at the site of the outbreak and at the stages of medical evacuation.	All		
		6	12	0
		Online		
		0	0	0

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
	<i>12 Semester</i>
1 - 4	Disaster Medicine Basic concepts, definitions, classification, and health consequences of emergencies. Damaging factors of emergencies. Forecasting and assessing the situation during emergencies. Operational modes of the RSChS The essence of the medical evacuation system for the population in emergency situations. Types of medical care. Stages of medical evacuation. Organization and implementation of medical triage. Medical evacuation. Fundamentals of air ambulance services. Basic concepts of air ambulance evacuation.

	<p>Organization and methods of air ambulance evacuation.</p> <p>Medical and tactical characteristics of natural disaster sites: earthquakes, floods, mudflows, landslides, etc</p> <p>Medical and tactical characteristics of man-made emergency sites: industrial, transport, environmental, and other.</p> <p>Medical and sanitary support for the population during the aftermath of natural and man-made emergencies, and terrorist attacks.</p> <p>Definition, classification and content of sanitary-hygienic and anti-epidemic measures in emergency situations.</p> <p>Characteristics of the epidemic outbreak. List of measures taken to prevent and eliminate epidemic outbreaks.</p> <p>Ensuring the readiness of healthcare facilities to operate in emergency situations. Organizing and implementing measures to protect patients and medical personnel from the harmful effects of emergency situations</p> <p>Objectives and principles of supplying medical equipment to disaster medicine units and institutions. Classification and characteristics of medical equipment. Determining the need for medical equipment. Organizing accounting and reporting on medical equipment.</p> <p>Psychotraumatic factors in emergency situations. Organization of medical and psychological assistance to the population and rescuers in emergency situations.</p> <p>Participation of the Armed Forces Medical Service in emergency response. Characteristics of institutions and units of the Armed Forces Medical Service.</p> <p>Organization of medical support for the population during local armed conflicts</p>
5 - 8	<p>Toxicology</p> <p>The concept of poisons, hazardous chemical substances (AHOV) and toxic agents.</p> <p>Classification and general characteristics of toxic chemicals, assessment of their hazard to humans. The subject, purpose, and objectives of emergency toxicology. The main directions of its development as a scientific and academic discipline.</p> <p>List and classification of chemicals that disrupt the generation, conduction, and transmission of nerve impulses. Organophosphorus compounds: mechanism of toxic action. Clinical presentation of lesions. Prevention of lesions, first aid at the site of injury, and medical care during medical evacuation.</p> <p>List and classification of substances. Mechanism of action, pathogenesis, and manifestations of the toxic process in cases of exposure to cytotoxic chemicals. Prevention of exposure, provision of medical care at the site of exposure and during medical evacuation</p> <p>List and classification of substances. Mechanism of action, pathogenesis, and manifestations of toxicity in cases of exposure to chemicals with general toxicity. Prevention of exposure, provision of medical care at the site of exposure and during medical evacuation</p> <p>List and classification of substances. Mechanism of action, pathogenesis, and manifestations of toxic processes of toxic agents (poisonous substances) with pulmonary toxicity.</p> <p>Prevention of injuries, provision of medical care at the site of an outbreak and during medical evacuation.</p> <p>List and classification of substances that temporarily incapacitate. Toxic substances with irritant and psychotomimetic effects. Physicochemical and toxic properties of substances. Clinical presentation of injuries. Content and organization of medical care for victims at the site of an incident and during medical evacuation</p> <p>Physicochemical and toxic properties of ethyl and methyl alcohols, ethylene glycol, dichloroethane, and tetraethyl lead. Mechanisms of toxic action and pathogenesis of intoxication. Main manifestations of the toxic process. First aid and principles of treating injuries.</p> <p>Types of toxic hypoxia. Purpose, design principles, and operating procedures. Safety precautions when using oxygen</p>

9 - 11	<p>Radiology</p> <p>The goals and objectives of radiology as a science and academic discipline. Fundamentals of the biological effects of ionizing radiation. Fundamentals of dosimetry. Units of measurement for ionizing radiation. Factors causing injuries to people during nuclear explosions and radiation accidents at nuclear power plants.</p> <p>The concept of radioactive contamination zones. Radiation exposure zones. Protective measures to reduce radiation exposure to personnel and the public during radiation disasters. Acute and chronic radiation sickness. Classification, forms, stages, and clinical manifestations. Principles of prevention and treatment of acute radiation sickness.</p>
12 - 16	<p>Medical protection</p> <p>Classification and general characteristics. Personal protective equipment for the respiratory system, skin, and eyes, their physiological and hygienic characteristics. Medical support for work involving personal protective equipment for the respiratory system and skin.</p> <p>Standard medical protective equipment. Personal first aid kits, essential components, and their purpose. Radioprotectors. Means for long-term maintenance of increased radioresistance. Means for preventing the general primary reaction to radiation and early (pre-hospital) treatment of acute radiation sickness. Emergency iodine prophylaxis.</p> <p>Medical and tactical characteristics of sites affected by toxic and hazardous chemical substances. Chemical reconnaissance and monitoring: purpose, objectives, organization, and procedures.</p> <p>Methods for detecting and identifying toxic chemicals in various environments. Purpose, design, and operating procedures for devices designed to indicate toxic chemicals.</p> <p>Organization and procedures for testing water and food for toxic chemical contamination.</p> <p>Radiation reconnaissance and monitoring: purpose, objectives, organization, and procedures.</p> <p>Radiation reconnaissance and monitoring tools and methods. Methods for measuring ionizing radiation. Radiation reconnaissance and monitoring devices: purpose, design, and operating procedures. Organization and procedures for testing water and food for radioactive contamination</p> <p>Definition of special treatment, its purpose, and types. Theoretical foundations of degassing and decontamination. Partial special treatment and the means used for its implementation.</p> <p>Complete special treatment. Safety measures during special treatment</p>

6. EDUCATIONAL TECHNOLOGIES

The course is taught using methods based on modern advances in science and information technology in education. These methods are aimed at improving the quality of specialist training by developing students' creativity and independence. For this purpose, both traditional teaching methods (lectures, practical classes) and interactive practical classes are used.

1. Analysis of situational problems.
3. Practical lesson based on the case method

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)
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ПК-3.1	3-ПК-3.1	PFE, S-8, Task-15
	У-ПК-3.1	PFE, S-8, Task-15
	В-ПК-3.1	PFE, S-8, Task-15
УК-8	3-УК-8	PFE, S-8, Task-15
	У-УК-8	PFE, S-8, Task-15
	В-УК-8	PFE, S-8, Task-15

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 – <i>«excellent»</i>	<i>«pass»</i>	A
85-89	4 – <i>«good»</i>		B
75-84			C
70-74			D
65-69	3 – <i>«satisfactory»</i>		E
60-64		F	
below 60	2 – <i>«fail»</i>	<i>«fail»</i>	

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 G19 Disaster medicine : учебник, Kavalersky G.M., Garkavi A.V., Москва: ГЭОТАР-Медиа, 2019
2. ЭИ L38 First aid in case of accidents and disasters : учебное пособие, Kostyuchenko M. V., Levchuk I. P., Москва: ГЭОТАР-Медиа, 2023
3. ЭИ В 78 Защита населения и территорий в чрезвычайных ситуациях. Основы топографии : учебник для вузов, Вострокнутов А. Л., Супрун В. Н., Шевченко Г. В., Москва: Юрайт, 2024
4. ЭИ Л34 Медицина катастроф : учебник, Левчук И.П., Третьяков Н.В., Москва: ГЭОТАР-Медиа, 2021
5. ЭИ М 42 Медицина катастроф : учебник, Колесниченко П.Л., Москва: ГЭОТАР-Медиа, 2021

FURTHER READING:

1. ЭИ Н 29 Безопасность жизнедеятельности, медицина катастроф. В 2 томах. Том 1. : , Наркевич И.А., Москва: ГЭОТАР-Медиа, 2023
2. ЭИ В63 Военно-полевая хирургия. Национальное руководство : практическое руководство, , Москва: ГЭОТАР-Медиа, 2024
3. ЭИ А 94 Неотложная токсикология : практическое руководство, Афанасьев В.В., Москва: ГЭОТАР-Медиа, 2010
4. ЭИ З-86 Основы радиационной гигиены : учебное пособие для вузов, Соколов В. Д., Зорина И. Г., Санкт-Петербург: Лань, 2023
5. ЭИ В 54 Судебно-медицинская экспертиза: гистологические исследования : учебное пособие для спо, Витер В. И. [и др.], Москва: Юрайт, 2024

SOFTWARE:

No special softwares is required

LMS AND ONLINE RESOURCES

<https://online.mephi.ru/>

<http://library.mephi.ru/>

9. LOGISTICAL SUPPORT

1. Дозиметр ЭКОМЕДИКА AIR-02 (64-303)
2. Многокомпонентный газоанализатор МАГ-6 С (O2, CO2, CO, NH3, H2S) (64-303)

3. Интерактивная доска SMART SBM 685 (64-407)
4. Мышь, клавиатура (64-407)
5. Персональный компьютер: Моноблок Lenovo V540-24IWL All-In-One 23,8" i3-8145U 8Gb 256GB_SSD_M.2 Intel (64-407)
6. Проектор SMART P109 (64-407)

10. EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS FOR STUDENTS

Recommendations for preparing for seminars.

The practical lesson plan, topics, recommended readings, and the course's goals and objectives are communicated by the instructor during introductory classes or in the course's curriculum. Practical lessons help students gain a deeper understanding of the course material and develop skills for creatively working with scientific literature.

Before you begin studying the topic, you need to familiarize yourself with the main questions of the practical lesson plan and the list of recommended literature.

When preparing for a practical lesson, you should first review lecture notes, textbook sections, and teaching aids to gain a general understanding of the topic's place and significance in the course being studied. Then, consult additional literature and take notes on the recommended sources.

In the process of studying the recommended material, it is necessary to understand the structure of the topic being studied, identify the main points, follow their logic and thereby delve into the essence of the problem being studied.

It is necessary to keep records of the material being studied in the form of notes, which, along with visual memory, also includes motor memory and allows for the accumulation of an individual fund of auxiliary materials for the rapid repetition of what has been read, for the mobilization of accumulated knowledge.

Basic note-taking forms: outline (simple and detailed), excerpts, and abstracts. During preparation, it's important to compare sources, consider the material being studied, develop an action plan, and carefully consider your oral presentation.

Recommendations for preparing for the test.

Test – 10-15-20-25 points. Each question – 1 (2) point.

TOPICS: Specified in each specific section

Answer requirements: A clear, detailed answer (2 points/question) or a choice of the correct answer to the test question (1 point/question).

Recommendations for preparing for a test/exam

Response requirements and evaluation criteria:

An "excellent" grade of 45-50 points on a test/exam is awarded for: a correct, complete, and logically constructed answer; the ability to use specialized terminology; the ability to illustrate theoretical principles with practical material.

A "good" grade of 35–44 points on the exam is awarded for: a correct, complete, and logically constructed answer with minor errors or inaccuracies; the ability to use specialized terminology, but incomplete conclusions or generalizations are made.

A "satisfactory" grade of 30–34 points on the exam is given for: a schematic, incomplete answer; inability to use special terms or ignorance of them; with one serious error;

An "unsatisfactory" grade of <30 points on the exam is given for: answering all questions on the ticket with serious errors; inability to use specialized terminology; inability to give examples of the practical use of scientific knowledge.

Admission to the exam in a discipline is granted if the number of points exceeds 30.

A student can score from 30 to 50 points per semester.

The minimum score for an answer on the exam is 30, the maximum is 50.

11. EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS FOR TEACHERS

Grading and criteria for test papers, extended answer tests, homework assignments, and the final test:

1) - Tests are graded according to the following scheme: 1 point for every 1 correct answer. A student who has not started the work will receive a (-1) point.

2) - Tests with extended answers are graded according to the following scheme: complete answer - 2 points, incomplete answer - 1 point, no answer - 0 points, student who has not started the work - (-2) points.

3) - Homework must be completed by all students to be admitted to the final assessment. Late submissions will result in a (-1) point deduction from the final score.

4) - Presentation report grading criteria. Recalculation from a 100-point to a 10 (5)-point system.

5) - Essay grading criteria. Maximum 10 points. Possible conversion to a 5-point system.

10 points are awarded if all abstract writing requirements are met: the problem is identified and its relevance is justified, a brief analysis of the problem is provided and a logically presented position is presented, conclusions are formulated, the article is analyzed in full, the length is maintained, and formatting requirements are met.

9 points are awarded if the following abstract writing requirements are met: the problem is identified and its relevance is justified, a brief analysis of the problem is provided and a logically presented position is presented, conclusions are formulated, the article is analyzed in full, but the length is not maintained and formatting requirements are not met.

8 points – the main abstract requirements are met, but some shortcomings are present. Specifically, there are inaccuracies in the presentation of the material; there is a lack of logical consistency in the judgments; the abstract is not within the length; there are omissions in the formatting.

7 points – the main abstract requirements are met, but the following shortcomings are present: there are inaccuracies in the presentation of the material; Lack of logical consistency in reasoning; lack of conclusions; inadequate abstract length; formatting deficiencies.

6 points – significant deviations from abstracting requirements; topic covered only partially; factual errors in the abstract content; lack of conclusions and personal perspective on the issue.

5 points – significant deviations from abstract requirements: topic covered only partially; factual errors in the presentation of materials and methods; lack of conclusions and personal perspective on the issue; format not followed.

4 points – significant deviations from abstract requirements: topic relevance is not addressed; factual errors in the presentation of materials and methods; lack of conclusions and personal perspective on the issue; format not followed.

3 points – lack of analysis of the relevance of the research topic, approaches, and methods used, despite formally adhering to the abstract length.

2 points – topic not addressed; significant misunderstanding of the issue. The abstract's length and formal requirements are met.

1 point – the abstract's topic is not fully covered, revealing a significant lack of understanding of the problem.

0 points – the student did not submit an abstract.

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