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

ГИГИЕНА / HYGIENE

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**
7	2	72	20	40	0		12	0	PFE
8	3	108	10	20	0		51	0	Ex
Total	5	180	30	60	0	20	63	0	

ABSTRACT

During the course students develop knowledge of the impact of environmental factors on public health, the ability to competently and comprehensively assess the interactions between the body and the environment, identify environmental factors that have a positive or negative impact on the body, and the degree of interaction. They also develop skills in organizing and implementing preventive health measures aimed at improving the environment and public health, and promoting the scientific foundations of a healthy lifestyle.

This course fosters a conscious understanding of the relationship between health and the environment, living conditions, and work activities, with the goal of effectively diagnosing, treating, and preventing diseases.

The acquired knowledge, skills, and abilities are necessary for solving such professional tasks as teaching patients basic health-improving hygiene measures that contribute to disease prevention and health promotion; preventing disease occurrence in the population through preventive and anti-epidemic measures; and motivating the population, patients, and their families to maintain and improve their health and the health of others.

1. ACADEMIC COURSE GOALS AND OBJECTIVES

The objective of this course is to develop competencies in the qualified and comprehensive assessment of the interaction between the body and the environment, the ability to identify environmental factors that have a positive or negative impact on the human body, assess the degree of this interaction, and implement specific preventive measures aimed at improving the environment and public health.

Objectives of this course:

- students will master the scientific foundations of hygiene and methods of hygienic research of environmental objects;
- study the principles of health-improving and preventive measures;
- acquisition of skills in the use of environmental factors and the achievements of scientific and technological progress for health purposes.
- development of hygienic (preventive) thinking in students

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

The course is part of the core program of the specialist degree.

Successful completion of this course requires knowledge, skills, and abilities gained through the following disciplines: Medical and Biological Physics, Life Safety, Normal and Pathological Physiology (for the "Hospital Hygiene" and "Child and Adolescent Hygiene" modules, the functional systems of the human body, their regulation and self-regulation under environmental influences, and the functioning of individual organs and systems); Radiobiology, Medical Microbiology and Virology (for the "Water and Water Supply Hygiene," "Hospital Hygiene," and "Food Hygiene" modules, the classification, morphology, and physiology of microorganisms and their identification, distribution, and impact on human health, as well as microbiological research methods); and Immunology.

The knowledge, skills, and abilities gained through this course are essential for mastering all subsequent professional disciplines.

3. DEVELOPED COMPETENCIES AND INTENDED LEARNING OUTCOMES

Universal and/or general professional competencies:

Competency code and title	**Code and title of competency-based rubrics**
ОПК-2 [1] – Capable of conducting and monitoring the effectiveness of measures for prevention, healthy lifestyle promotion, and sanitary-hygienic education of the population	З-ОПК-2 [1] – Know: - regulatory foundations for conducting preventive medical examinations and health check-ups; - rules for implementing sanitary and anti-epidemic measures; - forms and methods of health education work; - sanitary rules and regulations; - national immunization schedule; - main hazardous and harmful occupational factors. У-ОПК-2 [1] – Be able to: - determine medical indications for imposing restrictive measures (quarantine) and conduct anti-epidemic measures in case of an infection outbreak; - conduct preventive medical examinations and health check-ups in accordance with current regulatory legal acts and other documents; - monitor the effectiveness of measures for disease prevention, health promotion, and sanitary-hygienic education of the population; - develop and implement health promotion programs aimed at eliminating harmful effects of environmental factors on human health; - establish cause-effect relationships between changes in health status and exposure to environmental factors. В-ОПК-2 [1] – Possess skills in: - organizing and conducting preventive medical examinations and health check-ups for the adult population to prevent the occurrence and/or spread of diseases and identify risk factors; - preparation (formation) and sending to the territorial office of the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing an emergency notification upon detection of an infectious or occupational disease; -educating patients and their relatives on methods of self-monitoring key physiological indicators.
УК-8 [1] – Capable of creating and maintaining safe living conditions in everyday life and professional activities to preserve the natural environment and ensure sustainable development of society, including in the event of the threat or occurrence of emergency situations and military conflicts.	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 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. 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. 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.

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**
research			
Analysis of scientific literature and official statistical reviews, participation in statistical analysis and public presentation of the results obtained.	Individuals (patients); the population; the set of means and technologies aimed at creating conditions for preserving and strengthening the health of the adult population	ПК-3.6 [1] - Able to analyze and publicly present medical research information *The base:* Professional standard: 02.019	З-ПК-3.6[1] - Know: - essence of research activities in medicine and healthcare, stages of medical research, design options; - types of scientific information sources, requirements for scientific text formatting and numerical data presentation; - main methods of statistical analysis.; У-ПК-3.6[1] - Be able to: - plan medical research and create databases for subsequent statistical processing; - search, select and analyze scientific information according to research objectives.; В-ПК-3.6[1] - Possess skills in: - preparing informational and analytical materials, including for public presentation of research results (presentation, report, abstract, article); - analyzing research results, their generalization and critical evaluation.

Solution of certain scientific research problems and scientific and applied tasks in the field of healthcare related to diagnosis, treatment, medical rehabilitation, and prevention.	Individuals (patients); the population; the set of means and technologies aimed at creating conditions for preserving and strengthening the health of the adult population	ПК-3.7 [1] - Able to participate in implementing research results into practical healthcare activities regarding diagnosis, treatment, medical rehabilitation and prevention. *The base:* Professional standard: 02.019	З-ПК-3.7[1] - Know: - main provisions of regulatory framework for research activities in healthcare; - principles of evidence-based medicine.; У-ПК-3.7[1] - Be able to: - apply results of medical research for patient benefit based on evidence-based medicine.; В-ПК-3.7[1] - Possess skills in: - using research results in practical healthcare activities regarding diagnosis, treatment, medical rehabilitation and prevention.

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)
Professional education	Establishing conditions for: formation of motivation to improve the quality of medical care to the population and the desire to follow the rules and norms of interaction between the doctor, colleagues and the patient, contributing to the creation of the most favorable environment for the patient's recovery (B34)

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**
	7 Semester						
1	Environmental hygiene	1-8	10/20/0	Т-8 (25)	25	Т-8	З-ОПК-2, У-ОПК-2,

							З-ПК-3.6, У-ПК-3.6, В-ПК-3.6, З-ПК-3.7, У-ПК-3.7, В-ПК-3.7, З-УК-8, У-УК-8, В-УК-8
2	Nutrition as a factor in maintaining and strengthening health	9-16	10/20/0	Т-15 (25)	25	Т-15	З-ОПК-2, У-ОПК-2, З-ПК-3.6, У-ПК-3.6, В-ПК-3.6, З-ПК-3.7, У-ПК-3.7, В-ПК-3.7, З-УК-8, У-УК-8, В-УК-8
	Totals for 7 Semester		20/40/0		50		
	Assessment events for 7 Semester				50	PFE	З-ОПК-2, У-ОПК-2, В-ОПК-2, З-УК-8, У-УК-8, В-УК-8
	8 Semester						
1	Occupational hygiene and work of medical organizations	1-8	6/8/0	Т-8 (25)	25	Т-8	З-ОПК-2, У-ОПК-2, З-ПК-3.6, У-ПК-3.6, В-ПК-3.6, З-ПК-3.7, У-ПК-3.7, В-ПК-3.7, З-УК-8, У-УК-8, В-УК-8
2	Hygienic principles for ensuring normal growth and development of a child	9-15	4/12/0	Т-15 (25)	25	Т-15	З-ОПК-2, У-ОПК-2, З-ПК-3.6, У-ПК-3.6, В-ПК-3.6, З-ПК-3.7, У-ПК-3.7, В-ПК-3.7, З-УК-8, У-УК-8, В-УК-8
	Totals for 8 Semester		10/20/0		50		
	Assessment events for				50	Ex	З-ОПК-2,

	8 Semester						У-ОПК-2, В-ОПК-2, 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**
T	Testing
PFE	Pass/fail examination
Ex	Exam

SYLLABUS

Weeks	**Topics / Content**	**Lect., hrs.**	**Pr./sem., hrs.**	**Lab., hrs.**
	7 Semester	20	40	0
1-8	**Environmental hygiene**	10	20	0
1 - 4	**Air Hygiene** The environment, natural, anthropogenic, and social factors that shape public health. Atmospheric air, its chemical composition and physical properties. The impact of meteorological factors on the body. Indoor microclimate. Regulatory documents. Solar radiation and its biological effects (infrared radiation, visible light, ultraviolet radiation). Natural and artificial indoor lighting. Hygienic requirements and assessment methods. Regulatory documents. The use of artificial ultraviolet radiation for preventive purposes. Natural and anthropogenic changes in the environment, their hygienic and ecological significance. Risk assessment methods for chemicals polluting the atmosphere. Regulatory documents	All 4 Online 0	10 0	0 0
5 - 8	**Water Hygiene** Water as a biosphere factor; hygienic requirements for drinking water quality and the selection of water supply sources, regulatory documents. The role of water in the spread of infectious and parasitic diseases. Methods for improving water quality. Soil as an environmental factor. Soil pollution and self-purification. The role of soil in the transmission of endemic, infectious, and parasitic diseases. Hygienic assessment, indicators, and assessment methods. Regulatory documents.	All 6 Online 0	10 0	0 0
9-16	**Nutrition as a factor in maintaining and strengthening health**	10	20	0
9 - 12	**Healthy Eating** Concepts of healthy eating. Physiological standards of	All 6	10	0

	nutrition. Hygienic assessment of nutritional adequacy. The importance of proteins, fats, carbohydrates, minerals, and vitamins in human nutrition. Standards for these food components and their sources. Components of food products and their importance for healthy human nutrition.	Online		
		0	0	0
13 - 16	**Food Safety** Methods for assessing food quality. Methods of food adulteration. The impact of adulterated food products on human health. Diseases caused by contaminated food products. Microbial and non-microbial food poisoning.	All		
		4	10	0
		Online		
		0	0	0
	8 Semester	10	20	0
1-8	**Occupational hygiene and work of medical organizations**	6	8	0
1 - 4	**Impact of Harmful Occupational Factors on Human Health** Fundamentals of Occupational Physiology. Changes in the Body During Work. Hygienic Classification and Criteria for Assessing Working Conditions Based on Harmfulness and Hazard Indicators of Occupational Environmental Factors. Hygienic Assessment of the Microclimate of Industrial Premises. Hygienic Assessment of Occupational Dust, Noise, and Vibration. Pneumoconiosis. Noise and Vibration Diseases. Hygienic Aspects of Working with Ionizing and Non-ionizing Radiation. Industrial Toxicology. Acute Poisoning and Chronic Intoxication with Various Toxic Substances. General Principles of Occupational Disease Prevention	All		
		3	4	0
		Online		
		0	0	0
5 - 8	**Hygiene in Medical Organizations** The importance of optimal hygienic conditions in hospitals for successful treatment. Hygienic requirements for the location and layout of medical facilities. Internal layout of hospitals and clinics. Occupational hazards in the healthcare system and their prevention. Prevention of nosocomial infections.	All		
		3	4	0
		Online		
		0	0	0
9-15	**Hygienic principles for ensuring normal growth and development of a child**	4	12	0
9 - 12	**Children's Health and Physical Development** Age-related anatomical and physiological characteristics of the child's body. Key patterns of child growth and development. Physical development as one of the most important indicators of health. Methods for studying physical development. Assessing the level of biological development in preschool and school age. Criteria for assessing children's health. "School" diseases	All		
		2	6	0
		Online		
		0	0	0
13 - 15	**Educational Hygiene. Hygienic Requirements for Educational Institutions** Educational Hygiene. Hygienic Requirements for Educational Institutions Hygienic Foundations of the Teaching and Upbringing Process in Educational Institutions. Hygienic Requirements for Preschool Educational Institution Layout and Equipment. Hygienic Foundations of Physical Education. Hardening of Children and Adolescents. Hygienic Foundations of Work and Vocational Training. Therapeutic, Health-Related, and Anti-Epidemic Measures. Hygienic Education and Requirements for Children's Products	All		
		2	6	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
	7 Semester
1 - 4	**Air Hygiene** 1.1.1 The environment, natural, anthropogenic, and social factors shaping public health. 1.1.2 Atmospheric air, its chemical composition and physical properties. The impact of meteorological factors on the body. Indoor microclimate. Regulatory documents. 1.1.3 Solar radiation and its biological effects (infrared radiation, visible light, ultraviolet radiation). Natural and artificial indoor lighting. Hygienic requirements and assessment methods. Regulatory documents. Use of artificial ultraviolet radiation for preventive purposes. 1.1.4 Natural and anthropogenic changes in the environment, their hygienic and ecological significance. Risk assessment methods for chemicals polluting the atmosphere. Regulatory documents
5 - 8	**Water and Soil Hygiene** 1.2.1 Water as a biosphere factor; hygienic requirements for drinking water quality and the selection of water supply sources, regulatory documents. 1.2.2 The role of water in the spread of infectious and parasitic diseases. 1.2.3 Methods for improving water quality. 1.2.4 Soil as an environmental factor. Soil pollution and self-purification. The role of soil in the transmission of endemic, infectious, and parasitic diseases.
9 - 11	**Healthy Eating** 2.1.1 Concepts of Healthy Eating. Physiological Norms of Nutrition. 2.1.2 Hygienic Assessment of Nutritional Adequacy. Nutritional Status. 2.1.3 The Importance of Proteins, Fats, Carbohydrates, Minerals, and Vitamins in Human Nutrition. Standards for These Food Components and Their Sources of Intake. 2.1.4 Components of Food Products and Their Importance for Healthy Human Nutrition
12 - 16	**Food Safety** 2.2.1 Methods of Food Quality Assessment 2.2.2 Methods of Food Adulteration. The Impact of Adulterated Food on Human Health 2.2.3 Diseases Caused by Contaminated Food 2.2.4 Microbial and Non-microbial Food Poisoning
	8 Semester
1 - 4	**Impact of Harmful Occupational Factors on Human Health** 1.1.1 Fundamentals of Occupational Physiology. Changes in the Body During Work. Hygienic Classification and Criteria for Assessing Working Conditions Based on Harmfulness and Hazard Indicators of Occupational Environmental Factors.

	1.1.2 Hygienic Assessment of the Microclimate of Industrial Premises. Hygienic Assessment of Occupational Dust, Noise, and Vibration. Pneumoconiosis. Noise and Vibration Diseases. Hygienic Aspects of Working with Ionizing and Non-ionizing Radiation. 1.1.3 Industrial Toxicology. Acute Poisoning and Chronic Intoxication with Various Toxic Substances. General Principles of Occupational Disease Prevention
5 - 8	**Hygiene of Medical Facilities** 1.2.1 The Importance of Optimal Hygienic Conditions in Hospitals for Successful Treatment. Hygienic Requirements for the Layout and Site Planning of Medical Facilities. 1.2.2 Internal Layout of Hospitals and Clinics. Occupational Hazards in the Healthcare System and Their Prevention. Prevention of Nosocomial Infections
9 - 11	**Health and Physical Development of Children and Adolescents** 2.1.1 Age-Related Anatomical and Physiological Characteristics of the Child's Body. Key Patterns of Child Growth and Development. 2.1.2. Physical Development as a Key Health Indicator. Methods for Studying Physical Development. Assessing the Level of Biological Development in Preschool and School Age. 2.1.3. Criteria for Assessing Children's Health. "School" Diseases.
12 - 15	**Educational Hygiene. Hygienic Requirements for Educational Institutions** Educational Hygiene. Hygienic Requirements for Educational Institutions 2.2.1 Hygienic Foundations of the Teaching and Upbringing Process in Educational Institutions. Hygienic Requirements for the Layout and Equipment of Preschool Educational Institutions. 2.2.2 Hygienic Foundations of Physical Education. Hardening of Children and Adolescents. Hygienic Foundations of Work and Vocational Training. Therapeutic, Health-Related, and Anti-Epidemic Measures. Hygienic Education, Requirements for Children's Products

6. EDUCATIONAL TECHNOLOGIES

The course's teaching utilizes 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 employed.

- training-based practical classes (situational hygiene control tasks, case studies, role-playing);
- engaging students in scientific preclinical and clinical research, preparing presentation materials, reports, essays, or papers.

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)**	**Assessment activity (Syl 2)**
ОПК-2	З-ОПК-2	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-15, T-8, T-15
	У-ОПК-2	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-15, T-8, T-15
	В-ОПК-2	PFE, T-8, T-15	Ex, T-8, T-15

ПК-3.6	З-ПК-3.6	Т-8, Т-15	Т-8, Т-15
	У-ПК-3.6	Т-8, Т-15	Т-8, Т-15
	В-ПК-3.6	Т-8, Т-15	Т-8, Т-15
ПК-3.7	З-ПК-3.7	Т-8, Т-15	Т-8, Т-15
	У-ПК-3.7	Т-8, Т-15	Т-8, Т-15
	В-ПК-3.7	Т-8, Т-15	Т-8, Т-15
УК-8	З-УК-8	PFE, Т-8, Т-15, Т-15	Ex, Т-8, Т-15, Т-8, Т-15
	У-УК-8	PFE, Т-8, Т-15, Т-15	Ex, Т-8, Т-15, Т-8, Т-15
	В-УК-8	PFE, Т-8, Т-15, Т-15	Ex, Т-8, Т-15, Т-8, Т-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 – *«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 Н99 Hygiene : учебник, Melnichenko P.I., Москва: ГЭОТАР-Медиа, 2021

2. ЭИ К 22 Гигиена : учебник для вузов, Карелин А. О., Александрова Г. А., Москва: Юрайт, 2024

FURTHER READING:

1. ЭИ Sh53 Educational and methodological textbook for practical classes on hygiene : учебное пособие, Shashina E.A., Makarova V.V., Москва: ГЭОТАР-Медиа, 2021

2. ЭИ К68 Гигиена питания. Руководство к практическим занятиям : учебное пособие, Никитенко Е.И., Королев А.А., Москва: ГЭОТАР-Медиа, 2024

3. ЭИ С 50 Инфекционная безопасность и инфекционный контроль в медицинских организациях : учебник для спо, Сметанин В. Н., Санкт-Петербург: Лань, 2024

4. ЭИ С 21 Охрана труда : учебник и практикум для вузов, Сафонова М. А., Сафонов А. А., Москва: Юрайт, 2024

5. ЭИ Ш 64 Производственная санитария и гигиена труда : учебник для вузов, Широков Ю. А., Санкт-Петербург: Лань, 2024

SOFTWARE:

No special softwares is required

LMS AND ONLINE RESOURCES

https://online.mephi.ru/

http://library.mephi.ru/

9. LOGISTICAL SUPPORT

1. Персональный компьютер: Моноблок Lenovo V540-24IWL All-In-One 23,8" i3-8145U 8Gb 256GB_SSD_M.2 Intel (64-303)

2. Мышь, клавиатура (64-303)

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

4. Проектор SMART P109 (64-303)

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

6. Весы напольные с ростомером медицинские Твес ВМЭН-200С-50/100-СТ (64-302)

7. Термометры бесконтактные, термометры аналоговые (64-301)

8. Дозиметр ЭКОМЕДИКА AIR-02 (64-303)

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

10. Люксметр RGK LM-20 (64-303)

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

10. EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS FOR STUDENTS

Recommendations for preparing for seminars.

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

Before beginning to study the topic, it is necessary to familiarize yourself with the key points of the practical class plan and the list of recommended readings.

When preparing for a practical class, you should first consult the 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, work with additional literature and take notes on the recommended sources. While studying the recommended material, it is important to understand the structure of the topic being studied, identify key concepts, follow their logic, and thereby gain a deeper understanding of the problem being studied. It is essential to keep notes of the material being studied. This, along with visual memory, also engages motor memory and allows for the accumulation of a personalized resource for quickly reviewing what has been read and mobilizing accumulated knowledge.

Basic note-taking forms: outline (simple and detailed), excerpts, and abstracts. During preparation, it is 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: Indicated in each specific section.

Answer requirements: a clear, detailed answer (2 points/task) or selecting the correct answer to a test task (1 point/task).

Recommendations for preparing for the test/exam

Answer requirements and grading criteria:

An "excellent" grade of 45-50 points on the 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 awarded for: a schematic, incomplete answer; an inability to use specialized terminology or lack of knowledge of them; with one serious error;

An "unsatisfactory" grade of <30 points on the exam is awarded for: answering all questions on the test with serious errors; Inability to use specialized terminology; inability to provide examples of the practical application of scientific knowledge.

Admission to the exam in this discipline is granted if the student's score exceeds 30.

A student can earn between 30 and 50 points per semester.

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

11. EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS FOR TEACHERS

Grading and criteria for tests, extended quizzes, homework, and the final test:

1) - Tests are graded according to the following scale: 1 point for every 1 correct answer. A student who has not started the work receives -1 point.

2) - Extended quizzes are graded according to the following scale: complete answer -2 points, incomplete answer -1 point, no answer -0 points, and a student who has not started the work receives -2 points.

3) - Homework must be completed by all students to be eligible for 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. Possibly upgraded to a 5-point system.

10 points are awarded if all abstract writing requirements are met: the problem is identified and its relevance justified, a brief analysis of the issue is provided and a logical position is presented, conclusions are formulated, the article is fully analyzed, 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 justified, a brief analysis of the issue is provided and a logical position is presented, conclusions are formulated, the article is fully analyzed, but the length and formatting requirements are not met.

8 points – the basic 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 specified length; and there are omissions in the formatting. 7 points – the basic abstract requirements are met, but the following shortcomings are present: there are inaccuracies in the presentation of the material; there is no logical consistency in the judgments; conclusions are not formulated, the abstract is not within the scope of the abstract; there are omissions in the formatting.

6 points – there are significant deviations from the abstracting requirements; the topic is only partially covered; there are factual errors in the abstract content, conclusions and a personal point of view on the problem are missing.

5 points – there are significant deviations from the abstract requirements: the topic is only partially covered; there are factual errors in the presentation of materials and methods, conclusions and a personal point of view on the problem are missing, the format is not maintained.

4 points – there are significant deviations from the abstract requirements: the relevance of the topic is not disclosed; Factual errors were made in the presentation of materials and methods, conclusions and personal perspective on the problem were missing, and the format was not followed.

3 points – there is no analysis of the relevance of the research topic, approaches, and methods used, although the formal length of the abstract is met.

2 points – the abstract topic is not covered, revealing a significant misunderstanding of the problem. However, the abstract length and formal requirements are met.

1 point – the abstract topic is not covered, revealing a significant misunderstanding of the problem.

0 points – the student did not submit an abstract.

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