



Національний технічний університет України
«КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ
ІМЕНІ ІГОРЯ СІКОРСЬКОГО»

Emblem

departments

Security department
labor, industrial and
civil safety
(if available)

LABOR PROTECTION AND CIVIL DEFENSE

Working program of the academic discipline (Syllabus)

Details of the academic discipline

Level of higher education

First (undergraduate)

Field of knowledge	14 Electrical engineering
Specialty Educational program	141 Power engineering, electrical engineering and electromechanics
Discipline status Form	Electromechanical automation systems, electric drive and electric mobility
of education Year	Normative
of preparation, semester	Full-time (full-time) / Part-time 3rd year, spring semester
Scope of the discipline	120 hours / 4 ECTS credits (lectures – 36 hours, practical classes – 28 hours, laboratory work – 8 hours, SRS – 48 hours)
Semester control/controls activities	Assessment / modular control work (MKR)
Class schedule	http://roz.kpi.ua/
Language of instruction	Ukrainian
Information about the course leader/teachers	Lecturer: Doctor of Technical Sciences, Professor Larisa Dmitrivna Tretyakova, email: larisa.tretyakova@ill.kpi.ua Consultations: every Thursday, 16:00-17:00 Practical: candidate of technical sciences, art. teacher Kalinchyk Vitaly Vasyliovych, email: karikory@gmail.com Consultations: every Tuesday, 16:00-17:00 Laboratory: Candidate of Technical Sciences Art. teacher Kalinchyk Vitaly Vasyliovych, email: karikory@gmail.com Consultations: every Tuesday, 16:00-17:00
Placement of the course	Sikorsky platform, Moodle, vk58zu course https://do.ipk.kpi.ua/

Program of educational discipline

1. Description of the educational discipline, its purpose, subject of study and learning outcomes

Employees are the main value and strategic resource of energy enterprises and determining factor of the effectiveness of their activities. Occupational health and safety is a system of measures and means to reduce the impact of occupational risks on workers, aimed at preserving the health, life and working capacity of workers. Functions of "Civil Defense" subdivisions on

energy enterprises are to protect workers, territory, environment and equipment in case of emergencies, in accordance with the requirements of the Code of Civil Protection of Ukraine - in peacetime, as well as in a special period.

The purpose of the discipline is to train specialists in the power industry who are capable solve typical tasks from all areas of professional activity in primary positions with mandatory compliance with occupational safety requirements and standards in everyday conditions, as well as know and follow civil safety measures during emergency situations, special and martial law.

The subject of the discipline concerns:

- State and departmental management of labor protection and civil protection at energy enterprises;
- risk-oriented methods of hazard assessment, rules and cultural priorities safety in the workforce at the energy enterprise, determination of their significance;
- safety requirements and ways to implement harmless and safe working conditions at workplaces in the systems of supplying consumers with electric energy;
- methods of protection against dangers, rules of behavior and actions of energy workers enterprises during emergency situations.

1. Program learning outcomes

Competencies: (K02) ability to apply knowledge in practical situations; (K03) ability to communicate in the state language orally and in writing; (K07) ability to work in a team; (K08). The ability to work autonomously; (K09) The ability to realize one's rights and responsibilities as a member of society, to be aware of the values of civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine; (K18) the ability to perform professional duties in compliance with the requirements of the rules of safety, labor protection, industrial sanitation and environmental protection.

Program learning outcomes: (PR07) Carry out process analysis in electric power, electrotechnical and electromechanical equipment, relevant complexes and systems; (PR09); Be able to evaluate the energy efficiency and reliability of power, electrotechnical and electromechanical systems; (PR10). Find the necessary information in scientific and technical literature, databases and other sources of information, evaluate its relevance and reliability; (PR11). Communicate freely about professional problems in national and foreign languages orally and in writing, discuss the results of professional activity with specialists and non-specialists, argue one's position on debatable issues; (PR12) understand the basic principles and tasks of technical and environmental safety of electrical engineering and electromechanics objects, take them into account when making decisions; (PR15). Understand and demonstrate good professional, social and emotional behavior, follow a healthy lifestyle. (PR16) know the requirements of regulatory acts related to engineering, intellectual property protection, labor protection, safety technology and industrial sanitation, take them into account when making decisions.

2. Pre-requisites and post-requisites of the discipline (place in the structural and logical scheme of training according to the relevant educational program).

To successfully master the discipline, the student must possess: the theoretical basis of the disciplines "Theoretical foundations of electrical engineering", "Electrical materials", "Electrical networks and systems", as well as "Fundamentals of a healthy lifestyle" and "Practical course

of a foreign language of professional direction", since part of the literature on the discipline is written in English. Competencies and program learning outcomes obtained in the process of studying the credit module are necessary for studying the disciplines "Power converters of electric drives", "Control of electric drives", and further completion of pre-diploma practice and high-quality implementation of the section "Occupational safety and fire safety" in the bachelor's diploma project.

3. Content of the academic discipline

Labor protection and civil protection.

Chapter 1. Life safety.

Topic 1. Introduction. Course structure. Basic concepts and definitions.

Topic 2. Emergency situations: causes and classification.

Topic 3. Risk-oriented method of assessment of industrial hazards and emergency situations.

Chapter 2. Labor protection.

Topic 4. Legal and organizational foundations of labor protection.

Topic 5. Occupational hygiene and industrial sanitation.

Topic 6. Personal protective equipment.

Topic 7. Production and industrial safety. Electrical safety.

Chapter 3. Civil safety and fire safety.

Topic 8. Emergency situations of man-made origin.

Topic 9. Fire and explosive safety.

Topic 10. Emergency situations of military origin

4. Educational materials and resources

Basic literature

1. Labor protection and civil protection: textbook / O.G. Levchenko and others; Kyiv, national technical Univ of Ukraine "KPI named after Igor Sikorsky". Kyiv: Osnova, 2019. 472 p.

2. Occupational safety and industrial safety: training. manual/ K.N. Tkachuk, L.D. Tretyakova and others; Kyiv, national technical University of Ukraine "KPI named after Igor Sikorsky". Kyiv: Libra, 2010. 558 p.

3. Zatsarny V.V., Prakhovnik N.A., Zemlyanska O.V., Zatsarna O.V. Life safety: education. manual Kyiv, national technical University of Ukraine "KPI named after Igor Sikorsky". Kyiv: NTUU "KPI", 2016. URL: // <http://ela.kpi.ua/kandle/123456789/18263/>.

4. Golinko V.I., Tretyakova L.D., Chebryachko S.I., Mityuk L.O. Methods of assessment and management of occupational risks in the manufacture and use of personal protective equipment: monograph. Kyiv: Osnova, 2021. 320 p.

5. Tretyakova L.D., Borychenko O.V., Mityuk L.O. Systems of artificial industrial lighting: Kyiv: KPI named after I. Sikorsky 2023. 86 p. URL: <https://ela.kpi.ua/handle/123456789/63861>

6. Tretyakova L.D., Mityuk L.O. A risk-oriented approach to the selection of personal protective equipment by I. Sikorsky 2024. 66 p. URL: <https://ela.kpi.ua/handle/123456789/63860>

7. Tretyakova L.D., Lytvynenko G.E. Personal protective equipment: production and application: training. manual Kyiv, national technical University of Ukraine "KPI named after Igor Sikorsky". Kyiv: Libra, 2008. 320

8. Golinko V.I., Tretyakova L.D., Cheberyachko S.I. *Designing personal protective equipment for workers: training. manual State University "NGU". Dnipro, NSU, 2017. 181 p.*

Additional literature

(optional / familiarization)

9. Tretyakova L.D., Seliverstov A.E. The latest solutions to the problem of individual protection of nuclear power plant workers: monograph. Kyiv: Osnova, 2016. 197 p.
10. Zdanovsky V.G., Kruzhylo O.E. Scientific developments of a risk-oriented approach in the field of occupational health and safety: monograph. Sumy: University Book, 2020. 384 p.
11. Kashtanov S.F. Modern legislation on the safety of industrial equipment and products: monograph. Riga, Lap Lambert Academic Publishing, 2018. 136 p.
12. Zatsarny V.V., Tretyakova L.D. Human safety in modern conditions: monograph. Kharkiv, FOP Mezyna, 2018. 208 p.
13. Tretyakova L., Mityuk L. Civil security as a factor in the development of industrial and non-industrial spheres of society: monograph / for science. ed. Assoc. Fedorchuk-Moroz V.I. Lutsk, Lutsk National Technical University, 2018. 236 p.
14. Gusev A.M., Mityuk L.O. Theory and practice of the formation of civil security in Ukraine: a monograph. ed. Assoc. Fedorchuk-Moroz V.I. Lutsk: IVV of Lutsk NTU, 2020. 218 p.
15. Rules for arranging electrical installations (PUE-2018). View. officer Kharkiv: Fort, 2018. 458 p.
16. DNAOP 1.1.10-1.01-97. Rules for the safe operation of electrical installations of consumers with a voltage of up to 500 kV. View. officer Kyiv: Ministry of Energy, 1998. 105 p.
17. DNAOP 0.00-1.21-98. Rules for the safe operation of electrical installations of consumers with a voltage of up to 220 kV. View. officer Kyiv: Ministry of Energy, 1998. 55 p.
18. DSN 3.3.6.042-99. State sanitary norms of the microclimate of industrial premises. View. officer Kyiv: State Standard of Ukraine, 1999. 56 p.
19. DSANPiN 3.3.2.007-98. State sanitary rules and norms for working with visual display terminals of electronic computing machines. View. officer Kyiv: Derzhstandard of Ukraine, 1998. 26 p.
20. GN 3.3.5-8-6.6.1-2014. Hygienic classification of work according to indicators of harmfulness and dangerous factors of the production environment, difficulty and intensity of the labor process: order dated 08.04.2014.m. N 248. Ed. officer Kyiv: Derzhnadyazhoronpratsi, 2014. 85 p.
21. DSANPiN 3.3.6.096-2002. State sanitary norms and rules when working with sources of electromagnetic fields. View. officer Kyiv: Derzhnadyazhoronpratsi, 2002. 38 p.
22. DSNiP 239-96. State sanitary norms and rules for the protection of the population from the influence of electromagnetic radiation. View. officer Kyiv: Derzhnadyazhoronpratsi, 1996. 35 p.
23. DSN 3.3.6.037-99. State sanitary norms of industrial noise, ultrasound and infrasound. View. officer Kyiv: Ministry of Health, 1996. 15p.

Literature, the bibliography of which is provided with a link, can be found on the Internet. Literature, the bibliography of which does not contain references, can be found in the library of KPI named after Igor Sikorsky. Certain sections of the basic literature [1]-[7] are mandatory for reading. Sections of the basic literature, which are mandatory for reading, as well as the connection of these resources with specific topics of the discipline are given below, in the methodology of mastering the academic discipline. All other literary sources are optional, it is recommended to familiarize yourself with them.

Educational content

5. Methods of mastering an educational discipline (educational component)

The educational discipline includes 36 hours of lectures, 28 hours of practical classes, 8 hours of laboratory classes, as well as the completion of a modular control work (MKR), which consists of two parts (by topic), lasting 1 acad. hours each

Practical and laboratory classes in the discipline are conducted with the aim of consolidating the theoretical provisions of the academic discipline and acquiring the skills and practical experience of students to operate with modern concepts in the field of labor protection and civil protection. Based on the distribution of time for studying the discipline, fourteen practical classes (including time for MKR) and four laboratory works are recommended.

Teaching methods and forms include not only traditional university lectures and seminar activities, but also elements of teamwork and group discussions. Active learning strategies are used, which are determined by the following methods and technologies: problem-based learning methods (research method); personal-oriented technologies based on such forms and methods of learning as case technology and project technology; visualization and information and communication technologies, including electronic presentations for lectures. Communication with the teacher is built using the "Electronic Campus" information system, the "Sikorsky" distance learning platform based on G Suite for Education, as well as such communication tools as e-mail and Telegram. During training and for interaction with students, modern information and communication and network technologies are used to solve educational tasks.

Lecture classes

No. z/p	The name of the topic of the lecture and a list of main questions (list of didactic tools, links to information sources)
Chapter 1. Life safety	
1	<p>Topic 1. Introduction. Course structure. Basic concepts and definitions. Basic concepts in the field of life safety, labor protection, civil protection. Terminology and definitions. International program of sustainable development. The main goals and objectives in the field of health protection of employees. Production sources of danger, dangerous and harmful factors.</p> <p>Literary sources: [1, 2]</p>
2	<p>Topic 2. Emergency situations: causes and classification.</p> <p>The "man-technogenic-living environment" system. Emergency situations of technogenic, natural and social origin: causes and classification.</p> <p>Literary sources: [1, 2, 12]</p>
3	<p>Topic 3. Risk-oriented method of assessment of industrial hazards and emergency situations.</p> <p>Risk as an indicator of hazard assessment. Definition of the concepts of "danger" and "risk". General risk assessment at the workplace. Types of risks. The concept of "acceptable risk".</p> <p>Literary sources: [2, 4, 9]</p>
4	<p>Topic 3. Risk-oriented method of assessment of industrial hazards and emergency situations</p> <p>Hazard classification. Risk assessment. Categories of severity of consequences. The level of probability of occurrence of hazards. Ranking of risks. Risk management strategy. Reduction of occupational risk through the implementation of preventive measures.</p> <p>Literary sources: [2, 4, 9]</p>
Chapter 2. Labor protection	
5	<p>Topic 4. Legal and organizational foundations of labor protection.</p> <p>Legislation of the European Union and Ukraine in the field of labor protection and industrial safety. State Department of Labor Protection. Basic provisions</p>

No. z/p	The name of the topic of the lecture and a list of main questions (list of didactic tools, links to information sources)
	state social insurance against accidents at work and occupational diseases. Organization of labor protection at the enterprise. Literary sources: [2, 5, 10, 13]
6	Topic 5. Occupational hygiene and industrial sanitation. General characteristics of working conditions in production. Requirements for production, auxiliary and premises with electrical installations. Requirements for the organization workplace Requirements for organizing a workplace with a computer. Analysis working conditions at energy enterprises. Peculiarities of working conditions at a computerized workplace Literary sources: [2, 8]
7	Topic 5. Occupational hygiene and industrial sanitation Methods of regulating the microclimate and the quality of the industrial air environment. Means of individual protection of respiratory organs. Standardization of natural and artificial lighting of industrial premises. Design methods of artificial lighting. Means of individual protection of the organs of vision Literary sources: [1, 2]
8	Topic 5. Occupational hygiene and industrial sanitation The main characteristics of noise, vibrations, ultra- and infrasound. The effect of noise on a person. Regulation, control and measurement of noise. Features of the occurrence of noise and vibrations in electrical installations. Means of individual protection of hearing organs. Ionizing radiation in electrical installations. Effects of ionizing radiation on humans. Indicators and standardization of ionizing radiation. Methods of monitoring at the workplace Literary sources: [1, 2]
9	Topic 6. Personal protective equipment Classification of personal protective equipment. Basic requirements for personal protective equipment. Recommendations for the selection and use of protective clothing, means of personal protection for the head, hands, organs of vision, organs of hearing and breathing. Literary sources: [4, 6, 7]
10	Topic 7. Production and industrial safety. Electrical safety. The urgency of the problem of electrical safety. General characteristics of electrical installations and thermal power equipment. Characteristics of regulatory documents on electrical safety and pressure vessels. Features of electrotraumatism. Literary sources: [2, 10]
11	Topic 7. Production and industrial safety. Electrical safety. The main dangers of operating electrical installations (definition). Effect of electric current and electromagnetic field of industrial frequency on a person. Theoretical basis of the occurrence of danger during use. Basic characteristics and standardization of electrical installations. industrial frequency electromagnetic field. Literary sources: [2, 11]

No. z/p	The name of the topic of the lecture and a list of main questions (list of didactic tools, links to information sources)
12	<p>Topic 7. Production and industrial safety. Electrical safety. <i>Classification of technical methods of protection against direct contact in electrical installations. Electrical insulation in electrical installations: materials, characteristics, calculation, requirements and methods of measuring insulation of electrical installations. Protective means. Methods of safe placement of current-carrying parts. Means of safety blocking in electrical installations. Orientation in electrical installations.</i></p> <p><i>Literary sources: [2, 15]</i></p>
13	<p>Topic 7. Production and industrial safety. Electrical safety. <i>Classification of methods of protection against indirect contact and step voltage in electrical installations. The principle of protective action of protective grounding in electric networks Construction of grounding devices. Requirements for grounding devices in electrical installations. Calculation method of the grounding device. Protective automatic shutdown. Protective equalization of potentials. Isolation zones. Ultra-low (low) voltage systems.</i></p> <p><i>Literary sources: [2, 15]</i></p>
14	<p>Topic 7. Production and industrial safety. Electrical safety. <i>Organization of safe operation of electrical installations. Requirements for employees who maintain electrical installations. Procedure for operation of operating electrical installations. Organizational measures during operation of operating electrical installations. Certification of the state of safety of electrical installations. Examination of consumers' electrical installations. Means of personal protection in electrical installations.</i></p> <p><i>Literary sources: [2, 15]</i></p>
Chapter 3. Civil and fire safety.	
15	<p>Topic 8. Emergency situations of man-made origin. <i>Types of man-made emergency situations. Stages of liquidation of emergency situations. Accidents at power plants: causes, development, consequences. The system of repair and restoration works at electric power enterprises. Literary sources: [1, 8, 12]</i></p>
16	<p>Topic 9. Fire and explosive safety. <i>Flammability groups of substances. Categories of premises and buildings. Classification of explosion- and fire-hazardous premises. Explosion and fire prevention system. Requirements for electrical installations in fire-hazardous and explosive-fire zones. Electrostatic spark safety measures in explosive and fire-hazardous areas. Equipping electric power facilities with primary means of fire extinguishing.</i></p> <p><i>Literary sources: [1, 2, 14]</i></p>
17	<p>Topic 9. Fire and explosive safety. <i>Risk-oriented approach to fire safety. Factors affecting the risks of fires and explosions. Physical basis of lightning manifestation. Lightning protection of buildings and structures. Classification of buildings and structures according to the level of lightning protection. Design features of the lightning conductor. Lightning protection design methods.</i></p> <p><i>Literary sources: [1, 11]</i></p>

No. z/p	The name of the topic of the lecture and a list of main questions (list of didactic tools, links to information sources)
18	<p>Topic 10. Emergency situations of military origin Peculiarities of emergency situations during military operations on the territory of Ukraine. Preparation and evacuation from the occupied territories. Methods of protection during missile and artillery attacks. Characteristics of combat poisonous chemical substances. Ways of protection while being in the zone of influence of poisonous chemicals.</p> <p>Literary sources: [1, 6]</p>

Practical classes

No. z/p	Name of the subject of the practical session and list of main questions (list of didactic tools, links to information sources)
1	<p>Topic 2. The influence of striking, dangerous and harmful factors on human health Conducting informational work in abstract and presentational form on the impact of the most common striking, dangerous and harmful professional factors in the electric power industry.</p> <p>Literary sources: [1, 2]</p>
2	<p>Topic 3. Hazard assessment and risk determination Methods of hazard analysis depending on the type of professional activity; lifestyle (main causes of additional risk), place of residence and possible erroneous actions of the employee. A variant of the technical system is selected, for which a qualitative analysis of the risk of hazards during its operation will be considered. Guided by the results of the qualitative analysis, a hazard of category A is selected, for which a quantitative risk assessment is performed.</p> <p>Literary sources: [4]</p>
3	<p>Topic 5. General principles of providing first aid to victims The practical methods of providing first aid to victims who have received the most common injuries (burn, cut, fall) or acute illness (exposure to current, poisoning by a chemical substance) are considered. The work consists in solving practical tasks, each of which describes the situation of a person receiving an injury. It is necessary to classify the injury (according to the degree of severity, depending on the influencing factors, according to the form of manifestation) and develop a strategy for providing first aid to the victim.</p> <p>Literary sources: [2]</p>
4	<p>Topic 5. Monitoring and ergonomic assessment of the workplace Theoretical knowledge of the principles and methods of monitoring and ergonomic assessment of the workplace, practical skills in calculating the assessment before and after the measures taken to reduce hazards and improve ergonomic indicators. Recommendations for optimizing the workplace are provided. Literary sources: [2, 5]</p>
5	<p>Topic 5. Evaluation and methods of cleaning the air of the working area and thermal protection. Theoretical knowledge of the main air parameters of the working area in the work premises, practical skills in conducting their assessment from the point of view of protection</p>

No. z/p	Name of the subject of the practical session and list of main questions (list of didactic tools, links to information sources)
	<p>work, get acquainted with the main measures aimed at improving the air environment and heat protection.</p> <p>Literary sources: [1, 2]</p>
6	<p>Topic 5. Assessment and methods of ensuring compliance with occupational health and safety requirements of noise, ultrasound, and infrasound parameters at workplaces.</p> <p>Practical knowledge of the methods of evaluating the parameters of noise, ultrasound, infrasound that occur at computerized workplaces in industrial premises, studying their effects on the human body, normalizing the parameters of these factors, familiarization with the main measures aimed at protecting workers from the negative effects of noise, ultrasound and infrasound.</p> <p>Literary sources: [1, 2]</p>
7	<p>Topic 5. Evaluation of parameters and indicators of natural and artificial lighting of industrial premises.</p> <p>Practical knowledge of methods for evaluating parameters and indicators of natural and artificial lighting of office premises, determining the role of light in ensuring the safety of the production process, standardization of artificial and natural lighting, familiarization with the main measures aimed at ensuring favorable conditions for visual work.</p> <p>Modular control work</p> <p>Literary sources: [1, 2]</p>
8	<p>Topic 7. Calculation of protective grounding</p> <p>Students consolidate and deepen theoretical knowledge and acquire practical skills in calculating the resistance of a grounding device. Performed grounding calculation in networks with a voltage of more than 1000 V and in networks with a voltage of up to 1000 V with a blindly grounded neutral.</p> <p>Literary sources: [2]</p>
9	<p>Topic 9. Calculation of the protection zone of the lightning conductor.</p> <p>Definition of the category of lightning protection, get acquainted with the purpose and design features of lightning protection. They study the design of lightning protection devices, their placement and calculation methods; perform calculations of lightning protection elements and parameters of a lightning arrester designed to protect against direct lightning strikes.</p> <p>Literary sources: [3]</p>
10	<p>Topic 9. Methodology for assessing and ensuring fire safety at an electric power facility.</p> <p>They familiarize themselves with the method of determining the category and class of the zone of premises according to explosion and fire danger, with fire prevention measures and fire protection.</p> <p>Literary sources: [1, 2]</p>
11	<p>Topic 8. Forecasting and evaluation of the consequences of explosions at an electric power facility.</p> <p>Solving typical problems of assessing the consequences of the manifestation of hazards during accidents at an explosive facility. After explaining the methodology of the work, each student performs the necessary calculations based on the initial data individual option.</p> <p>Literary sources: [1, 3]</p>

No. z/p	Name of the subject of the practical session and list of main questions (list of didactic tools, links to information sources)
12	<p>Topic 8. Assessment of the chemical situation during an accident or missile attack with the use of chemical weapons at an electric power facility.</p> <p>Forecasting and assessment of the situation during an accident on an electric power facility, on the territory of which chemically dangerous substances are placed; methods of operational and long-term forecasting; determination of quantitative territorial characteristics of the energy facility and drawing of zones of chemical contamination on the map (plan) of the area. Students learn: methods of forecasting and evaluating the chemical situation; the algorithm for determining the parameters of the chemical contamination zone (depth, width, area); assessment of the severity of the consequences of the accident. After explaining the method of performing the work, each student performs the necessary calculations based on the initial data of his option.</p> <p>Literary sources: [1, 3]</p>
13	<p>Topic 8. Forecasting and assessment of the radiation situation during an accident or missile attack on an electric power facility.</p> <p>Forecasting and assessment of the radiation situation; operational methods, long-term forecasting; modeling of zones of radioactive contamination (contamination) of the area; determination of geometric parameters of zones; assessment of the probability of the electric power facility entering the contamination zone and the duration of contamination; display of zones on a terrain plan (map). After explaining the methodology of the work, each student performs the necessary calculations based on the initial data of his option.</p> <p>Literary sources: [1, 3]</p>
14	<p>Topic 8. Evaluation of the reliability of the protection of employees of the object of economic activity from the use of protective structures in wartime.</p> <p>Determination of the most reliable way to protect people in emergency situations thanks to their shelter in specialized engineering structures: warehouses and anti-missile shelters. Explanation of the basic rules of behavior during artillery, bomb and rocket attacks. After explaining the methodology of the work, each student performs the necessary calculations based on the initial data of his option.</p> <p>Modular control work</p> <p>Literary sources: [1, 3].</p>

Laboratory classes

No. z/p	Name of the subject of the practical session and list of main questions (list of didactic tools, links to information sources)
1	<p>Topic 5. Research of artificial electric lighting.</p> <p>The purpose of the work: to get acquainted with the types and systems of lighting; to investigate the visual conditions of work by experimental and analytical methods; to investigate standardized indicators that characterize artificial lighting in the conditions of an educational laboratory; acquire practical skills in using measuring devices and regulatory documents; draw conclusions about improving the conditions of visual work.</p> <p>Laboratory stands and measuring devices are used.</p>

No. z/p	Name of the subject of the practical session and list of main questions (list of didactic tools, links to information sources)
	<p>Literary sources: [2]. http://opcb.kpi.ua/wp-content/uploads/2014/09/ÿÿ3.pdf</p>
2	<p>Topic 7. Organizational measures during the current exploitation of existing ones electrical installations. The purpose of the work: to get acquainted with the types of documents that allow to carry out measures during the current operation of existing electrical installations. Fill out the appropriate permit document depending on the type of planned work: permit order, order, document for current operation.</p> <p>Laboratory stands, permit forms, work registration log are used.</p> <p>Literary sources: [2]. http://opcb.kpi.ua/wp-content/uploads/2014/09/ÿÿ3.pdf</p>
3	<p>Topic 7. Features of use in control systems of electrical installations of safety relays of the ESR5 series. The purpose of the work is to determine the main features of the operation and application in the safety management systems of industrial equipment of the ESR5 series protective relays, developed according to new innovative technologies by the electrical engineering group "EATON", to assess the compliance of the algorithm of operation of the electrical installation or thermal power equipment with the existing safety requirements for the performance of the following functions: condition monitoring movable protective barriers (fences); guaranteed blocking of the movable protective barrier (fence), emergency shutdown of production equipment; prevention of uncontrolled start-up or repeated restart of production equipment after its emergency shutdown or in the event of an unexpected shutdown of the supply voltage.</p> <p>Laboratory stands and measuring devices are used.</p> <p>Literary sources: [2]. http://opcb.kpi.ua/wp-content/uploads/2014/09/ÿÿ3.pdf Topic 7.</p>
4	<p>Signal devices in security management systems electrical installations</p> <p>The purpose of the work is the study of signaling as a means of warning the employee about the occurrence of certain possible events in the relevant production environment, the division of signaling by functional purpose into operational, warning and recognition.</p> <p>The student needs to study the operation algorithm of the SLAS (3-module light) signal column and determine the type of light source in each of the 3 light modules and their modes of operation, as well as classify the functional purpose of these light modules according to the requirements of IEC/EN 60204-1, determine the acoustic mode set using the DIP switch</p> <p>module (type of sound signal), investigate the operating parameters of the signal light with a stroboscopic effect.</p> <p>Laboratory stands and measuring devices are used.</p> <p>Literary sources: [2]. http://opcb.kpi.ua/wp-content/uploads/2014/08/%D0%95ATON_2</p>

6. Independent work of the student

Independent work consists of the following types of activities: preparation for classrooms lecture, practical and laboratory classes; calculations based on primary data obtained in laboratory classes; writing an essay; doing homework. The plan for the distribution of hours by individual types of independent work is provided in Table 1.

Table 1. Hour distribution plan

Type of independent work	Total hours
Preparation for classroom lectures, practical and laboratory classes	24
Calculations based on primary data obtained in laboratory classes	6
Essay writing (optional) Preparation for test tasks	8
	4
Preparation for the test In general	6
	48

Policy and control

7. Policy of academic discipline

The system of requirements that the teacher sets before the student:

- rules for attending classes: in accordance with Order 1-273 dated 14.09.2020, it is prohibited to assess the presence or absence of the applicant at the classroom class, including awarding incentive or penalty points for this. According to the RSO of this discipline, points are awarded for the corresponding types of educational activity in lectures, practical and laboratory classes.

At the time of each lesson (lecture, laboratory, practical), the student must have the Zoom application installed on the device from which he works (in the case of distance learning), as well as open the course "Labor safety and civil protection" on the "MOODLE" platform (the access code to the course is provided at the first lesson according to

schedule). Syllabus; lecture material; practicum; tasks for each practical and laboratory session; variants of modular control work; tests to be completed after the lecture and practical classes; the list of questions for assessment is posted on the "MOODLE" platform and in the "KPI Electronic Campus" system.

- rules of behavior in classes: the student has the opportunity to receive points for the appropriate types of educational activity in lectures, laboratory and practical classes, provided for by the RSO of the discipline. The use of means of communication to search for information on the teacher's Google Drive, on the Internet, in a distance course on the "Moodle" platform is carried out under the condition of the teacher's instructions;
- rules for the protection of individual tasks: the curriculum does not provide for the implementation of individual tasks;
- rules for assigning incentive and penalty points: incentive and penalty points are not included in the main scale of RSO, and their sum does not exceed 10% of the maximum number of points. The total amount of incentive points cannot exceed 10 points. Incentive points are awarded for participation in scientific conferences, student competitions and Olympiads, for writing an article and its publication. For participation in the All-Ukrainian Olympiad (scientific competition

works) the student is awarded 5 (I round) or 10 (II round) points. For writing an article and its publication, the student is awarded 10 points (professional edition of Ukraine). For the publication of these reports and speech at a scientific conference - 10 points. Penalty points are not accrued;

- *policy of deadlines and rescheduling: each student is obliged to adhere to the deadlines for completing tasks within the schedule of conducting classroom classes on the discipline. Completion of MKR, completion of tasks for practical classes, and defense of laboratory work are a mandatory assessment control measure for admission to credit. exam consists of MKR and performance of tasks for practical classes. A student who for a valid reason (hospital, academic mobility, etc.) did not write the MKR, has the right to do so during regular consultations of the teacher according to the schedule. The procedure for rescheduling the semester control is determined by the general rules of the university¹ .*
- *policy on academic integrity: the Code of Honor of the National Technical University of Ukraine "Kyiv Polytechnic Institute" <https://kpi.ua/files/honorcode.pdf> establishes general moral principles, rules of ethical behavior of individuals and provides a policy of academic integrity for persons working and studying at the university, which they should be guided by in their activities, including when studying and preparing control measures in the discipline "Labor safety and civil protection". Teachers and students studying this discipline are obliged to comply with the provisions of the Code of Honor adopted at the university² ;*
- *when using digital means of communication with the teacher (mobile phone, e-mail, correspondence on forums and social networks, etc.), it is necessary to observe generally accepted ethical norms, in particular, be polite and limit communication during free working hours of the teacher (from 16:00 to 19:00 hours on working days).*

Inclusive education. *The acquisition of knowledge and skills in the course of studying the discipline can be accessible to most persons with special educational needs, except for students with serious visual impairments that do not allow you to perform tasks with the help of personal computers, laptops and/or other technical means.*

Studying in a foreign language. *In the course of the tasks, students may be recommended to refer to English-language sources.*

8. Types of control and rating system for evaluating learning outcomes (RSO)

Current control: *testing, MKR and performance of practical and laboratory tasks classes*

Calendar control: *conducted twice a semester as a monitoring of the current state of fulfillment of the syllabus requirements.*

Semester control: *assessment.*

1. *The student's credit module rating is calculated out of 100 points. The rating (during the semester) consists of points that the student receives for:*

- testing based on lecture materials (16 points);*
- performance of tasks for practical classes (42 points);*
- performance of tasks for laboratory classes (16 points);*

¹ *Provisions on current, calendar and semester control of study results at KPI named after Igor Sikorsky (Appendix 1 to Order No. 7-137 dated August 08, 2020). URL: https://kpi.ua/document_control*

² *Code of honor of the National Technical University of Ukraine "Kyiv Polytechnic Institute". URL: <https://kpi.ua/code>*

– writing the MKR (20 points).

2. Scoring criteria:

2.1 Testing based on lecture materials: weighted point – 8. The maximum number of points for testing – 8 points * 2 tests = 16 points.

The student performs testing in the form of two individual test tasks. The first test task is completed after studying chapters 1-4 in lecture classes, the second after studying chapters 5 and 6 in lecture classes.

2.2 Completion of tasks for practical classes: weighted point - 4. Maximum number of points for completing tasks for practical classes - 4 points * 13 tasks = 52 points.

In practical classes, students together with the teacher solve problems according to the subject of the practical class. After the practical session, students receive homework that must be solved and submitted to the teacher for review before the start of the next session (usually this is 2 weeks, but sometimes this time can be changed by the teacher under certain conditions).

Evaluation criteria:

- homework was solved correctly and submitted within the set time limit - 4 points;
- the homework was solved correctly, but it was handed in after the set deadline - 2 points;
- the homework was solved with minor errors and passed within the set time limit - 3 points;

- the homework was solved with minor errors and passed after the set deadline - 1 point;

- the homework is solved with errors - it is returned for revision.

2.3 Completing tasks for laboratory classes: weighted point – 4. The maximum number of points for completing tasks for laboratory classes is 4 points * 4 tasks = 16 points.

In laboratory classes, students together with the teacher perform tasks according to the subject of the class. After the laboratory session, students receive experimental data and homework, which must be completed and submitted to the instructor for review at the beginning of the next session (usually 2 weeks, but sometimes this time can be changed by the instructor under certain conditions).

Evaluation criteria:

- homework was solved correctly and submitted within the set time limit - 4 points;
- the homework was solved correctly, but it was handed in after the set deadline - 2 points;
- the homework was solved with minor errors and passed within the set time limit - 3 points;

- the homework was solved with minor errors and passed after the set deadline - 1 point;

- the homework is solved with errors - it is returned for revision.

2.4. Writing a modular test: the weighted score for one MKR is 20.

During the semester, one modular test is conducted, which is divided into two one-hour tests, for each of which the following evaluation criteria are established:

- full answer to theoretical questions, problems solved correctly - answer to theoretical questions with minor inaccuracy, minor errors in solving problems 7-8 points 9-10 points

– answers to theoretical questions are not complete or significant errors in solving problems 1-6 points

- unsatisfactory answer to theoretical questions, incorrect solution of problems 0 points

In order to give students the opportunity to correct the points received for the modular control work (at the student's own request), one day is set at the end of the semester, on which the assignments are resubmitted.

During the examination session, resubmission of papers is not carried out.

3. Calendar control: conducted twice a semester as a monitoring of the current state of meeting the syllabus requirements. The condition for positive first and second calendar controls is to obtain at least 50% of the maximum possible at the time of the corresponding calendar rating control.

4. The condition for admission to the credit is the enrollment of tasks in practical and laboratory classes, the completion of two modular control papers and a starting rating of at least 60 points.

5. A student can receive a credit based on the results of the points he received during the semester. If the student wants to increase the points, crediting is carried out. On balance students perform test tasks. Test tasks are valued at 40 points. Assignment to assessment consists of test tasks that contain twenty questions, each of which offers several answers, only one of which is correct. Each correct answer is valued at 2 points.

6. The sum of the starting points and the points for the test assignment is transferred to the final grade according to table 2.

Table 2. Total number of points

Evaluation method	Number	Minimum score in balach	Maximum evaluation in balach
Testing based on lecture materials classes	2	8	12
Execution of tasks to practical classes	13	32	52
Completing tasks for laboratory classes	4	10	16
MKR	2	10	20
Starting rating Credit Final rating	1	60	100
		40	-
		100	100

For correspondence education _____

Current control: performance of tasks for practical and laboratory classes (40 points) and MKR (20 points). The structure of the MKR, practical work, tests, requirements for them and evaluation criteria are similar to those for full-time education and are given above.

Semester control: assessment. Conditions for admission to the semester control: completed and credited MKR and tasks for practical classes and a starting rating of at least 60 points.

Students who have fulfilled the conditions for admission to credit, perform test tasks. Credit test tasks are valued at 40 points. The evaluation criteria are given above. Sum

starting points and points for the test task on credit is transferred to the final grade according to table 3.

Table 3. Correspondence of rating points to grades on the university scale

Number of points	Rating
100-95	Perfectly
94-85	Very good
84-75	Good
74-65	Satisfactorily
64-60	Enough
Less than 60	Unsatisfactorily
Admission conditions not met	Not allowed

9. Additional information on the discipline (educational component)

The list of topics that are submitted for semester control:

Topic 1. Basic concepts and definitions of labor protection and civil protection. Topic 2. Emergency situations: causes and classification

Topic 3. Risk-oriented method of assessment of industrial hazards and emergency situations

Topic 4. Legal and organizational foundations of labor protection

Topic 5. Occupational hygiene and industrial sanitation

Topic 6. Personal protective equipment

Topic 7. Production and industrial safety. Electrical safety. Topic 8. Emergency situations of man-made origin. Topic 9. Fire and explosive safety.

Topic 10. Emergency situations of military origin.

The list of questions submitted for semester control is given in the appendix to the syllabus.

A student of higher education has the opportunity to take online course(s) on one or more topics provided by the work program of the academic discipline. The applicant can choose an online course independently or on the recommendation of a teacher. 1 hour of the course is valued at 0.83 points. The maximum number of hours that can be credited for the results of non-formal education is 12 hours, accordingly, the maximum number of points for such results is 10 points.

For self-study, relatively simple questions are offered, which in most cases are descriptive in nature, designed to expand the horizons of students and repeat materials studied in other disciplines, and are directly related to the discipline.

Working program of the academic discipline (syllabus):

Compiled by:

Professor, Doctor of Technical Sciences, Professor Tretyakova

Larisa Dmitrivna

Adopted by the department of labor protection, industrial and civil safety (protocol No. 10 dated 14.06.2023).

Agreed by the Methodical Commission of the NN Institute of Energy Saving and Energy Management (protocol No. 12 dated 06/22/2023)