



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



Department of  
Occupational Safety,  
Industrial and  
Civil Safety

# "OCCUPATIONAL SAFETY AND CIVIL PROTECTION"

## Work program of the academic discipline (Syllabus)

Course details	
Level of higher education	<i>First (bachelor's)</i>
Field of knowledge	<i>17 Electronics, Automation, and Electronic Communications</i>
Special	<i>172 – Electronic Communications and Radio Engineering</i>
Educational programs	<i>Intelligent technologies of radio-electronic engineering Information and communication radio engineering Radio engineering computerized systems Radio-electronic warfare technologies</i>
Status of the discipline	<i>Mandatory</i>
Form of	<i>full-time/distance learning/blended learning</i>
Year of study, semester	<i>4th year, fall semester</i>
Scope of the discipline	<i>4 credits/120 hours 36 hours of lectures, 28 practical classes, 8 laboratory works</i>
Semester assessment/assessment measures	<i>Quick quizzes, quizzes on the topic of the lesson, tests, control tasks/credit</i>
Class schedule	<i>Website rozklad.kpi.ua.</i>
Language of instruction	<i>Ukrainian</i>
Information about the course leader/teachers	<p>Lecturer: <i>Serhii Fedorovych Kashtanov, PhD, Associate Professor, contact details: e-mail (<a href="mailto:Kashtanov.Sergey@ill.kpi.ua">Kashtanov.Sergey@ill.kpi.ua</a>); tel. 0507238244; from 9:00 a.m. to 6:00 p.m.</i></p> <p>Practical classes: <i>Alexander Yurievich Arlamov, PhD, Associate Professor, contact details: e-mail: (<a href="mailto:o.arlamov@kpi.ua">o.arlamov@kpi.ua</a>), <a href="http://opcb.kpi.ua/?p=1530">http://opcb.kpi.ua/?p=1530</a>); Tel: +38(097)393-29-30).</i></p> <p>Laboratory: <i>Ph.D., Associate Professor Alexander Yurievich Arlamov</i></p>
Course placement (lectures)	<p>Google Classroom: - course code for groups PE, PC, <b>PI</b>– (5sfxd6l); G Suit For Education in the domain @ill.kpi.ua Registration at the email address: <a href="https://classroom.google.com">https://classroom.google.com</a></p>

## Curriculum

### 1. Description of the academic discipline (credit module), its purpose, subject matter, and learning outcomes

Level of higher education, specialty, educational program, form of study	General indicators	Characteristics of the credit module
Level of higher education <i>first (bachelor's)</i>	Name of discipline <i>(to which the credit module belongs)</i> <u>"Occupational Safety and Civil Protection"</u>	Lectures <u>36</u> hours
Special <b>172</b> – Electronic Communications and Radio Engineering	Cycle <i>General training</i>	Practical <u>28</u> hours
Educational programs Intelligent technologies of radio electronics Information and communication Radio engineering Radio engineering computerized systems	Credit module status <i>Mandatory</i>	Laboratory <u>8</u> hours
Form of study <i>Full-time</i>	Semester <u>7</u>	Independent work <u>48</u> hours
	Number of credits (hours) <u>4 credits (120 hours)</u>	Type and form of semester assessment <i>Test</i>

The purpose of the credit module is for students to acquire the knowledge and skills necessary to carry out professional activities in their specialty with mandatory compliance with safety requirements and standards for health and safety at work, using the latest achievements in scientific and technological progress and international experience in safety, preservation of life, health, and working capacity; to instill in students a sense of responsibility for personal and collective safety in everyday conditions and during emergencies and martial law, taking into account the specifics of their future professional activities in their primary position.

The academic discipline belongs to the basic training cycle.

*The subject of the academic discipline* is the legislative, regulatory, socio-economic, engineering, technical, and sanitary-hygienic foundations of life safety, occupational safety, and civil protection.

In accordance with the educational and professional program, the discipline provides the following general (GC) and professional competencies (PC):

GC 01 Ability to think abstractly, analyze, and synthesize.

GC 02 Ability to apply knowledge in practical situations.

GC 09 Skills for safe activity.

PC 13 Ability to organize and implement occupational safety and health measures in the operation, maintenance, and repair of information and telecommunications networks, telecommunications, and radio engineering systems.

According to the educational and professional program, after mastering this academic discipline, students must demonstrate the following program learning outcomes (PLO):

PLO 17 Understanding and compliance with domestic and international regulatory documents on the development, implementation, and technical operation of information and telecommunications networks, telecommunications, and radio engineering systems.

PLO 22 Monitor the technical condition of information and communication networks, telecommunications and radio engineering systems during their technical operation in order to identify deterioration in performance or failures, and systematically record this by means of documentation.

## **2. Prerequisites and post-requisites of the discipline (place in the structural-logical scheme of training under the relevant educational program)**

Interdisciplinary connections: in structural-logical scheme training credit module "Occupational safety and civil protection" is studied at the stage of training specialists with a bachelor's degree after they have studied the basic disciplines of a professionally-oriented cycle, when future specialists have a sufficient understanding of the conditions of their future professional activity. This makes it possible to teach the discipline "Occupational Safety and Civil Protection" taking into account the professional orientation of students.

### 3. Content of the academic discipline (structure of the credit module)

Names of sections and topics	Number of hours				
	Total	including			
		Lectures	Practical classes	Laboratory work	SRC
1	2	3	4	5	6
<b>Chapter 1. Life safety.</b>	16	4	8	0	4
<b>Topic 1.1.</b> Categorical and conceptual apparatus of life safety.	2.5	2	0	0	0
<b>Topic 1.2.</b> Risk as a quantitative assessment of hazards.	10.5	2	6	0	2.5
<b>Topic 1.3.</b> Classification of injuries and provision of first aid.	3	0	2	0	1
<b>Section 2. Occupational safety.</b>	68	24	14	8	22
<b>Topic 2.1.</b> Introduction. Legal and organizational foundations of occupational safety.	2	1.5	0	0	0
<b>Topic 2.2.</b> State management of occupational safety, state supervision, and public control over occupational safety.	0.75	0	0	0	0.25
<b>Topic 2.3.</b> Training on occupational safety issues.	0.75	0	0	0	0.25
<b>Topic 2.4.</b> Occupational health and safety management system in an organization.	2	1.5	0	0	0.5
<b>Topic 2.5.</b> Prevention of injuries and occupational diseases. Investigation of accidents.	2.5	2	0	0	0
<b>Topic 2.6.</b> Social insurance against accidents and occupational diseases at work.	1.25	1	0	0	0
<b>Topic 2.7.</b> Fundamentals of occupational health and industrial hygiene.	1.25	1	0	0	0.25
<b>Topic 2.8.</b> Air in the work area.	3	0	2	0	1
<b>Topic 2.9.</b> Lighting of industrial premises.	1	0	0	0	1
<b>Topic 2.10.</b> Noise, ultrasound, infrasound, and vibrations.	0.5	0	0	0	0
<b>Topic 2.11.</b> Electromagnetic fields and radiation.	11.5	4	4	0	3.5
<b>Topic 2.12.</b> Radiation in the optical range.	0.5	0	0	0	0.5
<b>Topic 2.13.</b> Laser radiation.	0.5	0	0	0	0.5
<b>Topic 2.14.</b> Ionizing radiation	0.5	0	0	0	0.5

1	2	3	4	5	6
<b>Topic 2.15.</b> Certification of workplaces according to working conditions. Certification of production facilities.	2.5	2	0	0	0
<b>Topic 2.16.</b> Occupational and industrial safety. Current European legislation in the field of safety of production equipment and products.	2.5	2	0	0	0
<b>Topic 2.17.</b> Electrical safety.	17.5	4	4	4	5.5
<b>Topic 2.18.</b> Safety requirements for the design, manufacture, installation, testing, and operation of RTOs, telecommunications systems and networks, Wi-Fi equipment, and laser equipment.	14.5	2	4	4	4.5
<b>Topic 2.19.</b> Safety during gas-hazardous work in cable wells and underground telecommunications network structures.	0.5	0	0	0	0
<b>Topic 2.20.</b> Ensuring that environmental parameters comply with safety requirements when organizing workplaces for users of computer terminals in offices and automated workplaces.	2.5	2	0	0	0
<b>Section 3. Civil protection.</b>	28	8	4	0	16
<b>Topic 3.1.</b> Legislative and regulatory framework for civil protection.	4	2	0	0	2
<b>Topic 3.2.</b> Protection systems in emergency situations and during wartime.	4	2	0	0	2
<b>Topic 3.3.</b> Fire protection. Fire safety and prevention at industry facilities.	7.5	2	2	0	3.5
<b>Topic 3.4.</b> Elimination of the consequences of emergencies. Training of personnel of enterprises, institutions, and organizations, as well as the population, in actions during emergencies and in wartime.	1.5	1	0	0	0
<b>Topic 3.5.</b> Alerting, evacuation, and protection of personnel at economic facilities and the population in the event of emergency situations and martial law.	11	1	2	0	8
<i>Total</i>	112	36	26	8	42
<i>Diff. Credit</i>	8	0	2	0	6
<b>Total hours</b>	120	36	28	8	48

## 4. Learning materials and resources

*\*Note: In the list of educational materials and resources below, the main legislative and regulatory acts, as well as basic (textbooks, teaching aids) and additional (monographs, articles, documents, electronic resources, etc.) literature that should be used as a basis for mastering this discipline are marked with two asterisks and bold font.*

### 4.1. Key legislative and regulatory acts

- 1.1. Constitution of Ukraine. Basic Law of Ukraine dated 28.06.1996 No. 254k/96-VR (current version – 30.09.2016) – zakon4.rada.gov.ua.
- 1.2. **\*\* On labor protection: Law of Ukraine dated October 14, 1992, No. 2694-XII (current edition – 05.04.2015) – zakon5.rada.gov.ua.**
- 1.3. **\*\* Labor Code of Ukraine dated December 10, 1971, No. 322-VIII (current version – October 5, 2016) – zakon5.rada.gov.ua.**
- 1.4. **\*\* On ensuring the sanitary and epidemiological well-being of the population: Law of Ukraine dated February 24, 1994 No. 4004-XII (current version – December 28, 2015) – zakon5.rada.gov.ua.**
- 1.5. **\*\* Civil Protection Code of Ukraine dated 02.10.2012 No. 5403-VI (current version – 05.10.2016) – zakon2.rada.gov.ua.**
- 1.6. On industrial safety. Law of Ukraine dated 07.03.2008 No. 2201 – zakon0.rada.gov.ua.
- 1.7. On compulsory state social insurance: Law of Ukraine dated 23.09.1999 No. 1105-XIV (current edition – 01.01.2017) – zakon0.rada.gov.ua.
- 1.8. Code of Ukraine on Administrative Offenses dated December 7, 1984, No. 8073-X (current version – July 27, 2016) – zakon3.rada.gov.ua.
- 1.9. Fundamentals of Ukrainian Legislation on Health Care: Law of Ukraine dated 19.11.1992 No. 2801-XII (current edition – 01.01.2016) – zakon5.rada.gov.ua.
- 1.10. On Environmental Protection: Law of Ukraine dated 25.06.1991 No. 1264-XII (current edition – 01.01.2016) – zakon2.rada.gov.ua.
  - 1.11. On the use of nuclear energy and radiation safety: Law of Ukraine dated 08.02.1995 No. 39/95-VR (current edition – 26.10.2014) – zakon3.rada.gov.ua.
- 1.12. NRBU-97/D-2000 (DGN 6.6.1. - 6.5.061-2000) - Radiation Safety Standards of Ukraine; supplement: Radiation protection from sources of potential exposure approved by the Ministry of Health of Ukraine dated 12.07.2000 No. 116.
- 1.13. On the protection of humans from the effects of ionizing radiation: Law of Ukraine dated January 14, 1998, No. 15/98-VR (current edition - September 29, 2013) - K., 1998.
- 1.14. On approval of the National Social Program for the Improvement of safety, occupational health and the working environment for 2014-2018: Law of Ukraine dated 04.04.2013 (current edition – 01.01.2015) – zakon2.rada.gov.ua.
- 1.15. Convention concerning the promotion of safety and health at work No. 187: International document dated 15.06.2006 No. 187 – zakon5.rada.gov.ua.
- 1.16. On the basic principles of state supervision (control) in the field of economic activity: Law of Ukraine No. 877-V dated 05.04.2007 (current version – 01.01.2017) – zakon0.rada.gov.ua.
- 1.17. On collective agreements and contracts: Law of Ukraine No. 3356-XII dated 01.07.1993 (current version – 01.01.2015) – zakon2.rada.gov.ua.
- 1.18. On the Fundamentals of National Security of Ukraine: Law of Ukraine dated 19.06.2003 No. 964-IV (current version – 07.08.2015) – zakon5.rada.gov.ua.
- 1.19. On Technical Regulations and Conformity Assessment: Law of Ukraine dated January 15, 2015 No. 124-VIII.

- 1.20. \*\*On approval of the Procedure for training the population in emergency situations: Resolution of the Cabinet of Ministers of Ukraine No. 444 of 26 June 2013 – zakon3.rada.gov.ua.**
- 1.21. Regulations on the State Emergency Service of Ukraine: Decree of the President of Ukraine No. 20/2013 of January 16, 2013 – zakon5.rada.gov.ua.
- 1.22. \*\*On safety measures for possible risks of emergencies, terrorist acts, sabotage, and mining: Letter of the Ministry of Education and Science of Ukraine and the State Emergency Service of Ukraine dated February 5, 2015, No. 1/9-55/02-1645/12 – document.ua.**
- 1.23. Rules of technological safety, approved by order of the Ministry of Internal Affairs of Ukraine dated 05.11.2018 No. 879 (registered by the Ministry of Justice on 27.11.2018 under No. 1346/32798) / Ministry of Justice of Ukraine, 2018.

#### 4.2. Basic literature

- 2.1. Life Safety. Textbook/edited by G.P. Demydenko. – Kyiv: NTUU "KPI", 2008. – 300 p.
- 2.2. \*\* Life Safety and Civil Protection: Appendices for Students Majoring in Natural Sciences, Social Sciences and Humanities, and Engineering and Communication Technologies / O.G. Levchenko, O.V. Zemlyanska, N.A. Prahovnik, V.V. Zatsarny: NTUU "Igor Sikorsky KPI" – Kyiv: Karavela, 2019. – 312 p.**
- 2.3. Zatsarny V.V., Prahovnik N.A., Zemlyanska O.V., Zatsarna O.V. Life Safety: Textbook – Kyiv: NTUU "KPI" IEE, 2016. – electronic edition. /http://ela.kpi.ua/kandle/123456789/18263/.
- 2.4. Fundamentals of Occupational Safety [Electronic edition]: textbook / K. N. Tkachuk, V. V. Zatsarny, D. V. Zerkalov, O. I. Polukarov [et al]; NTUU "Igor Sikorsky KPI". – Electronic text data (1 file: 7.4 MB). – Kyiv: Osnova, 2015. – 456 p. – Title from the screen. – Access : <http://ela.kpi.ua/handle/123456789/18512>
- 2.5. \*\* Occupational safety and civil protection: textbook / O.G. Levchenko, O.I. Polukarov, V.V. Zatsarny, Yu.O. Polukarov, O.V. Zemlyanska; edited by Levchenko – Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2019 – 479 p.**
- 2.6. \*\* Tkachuk K. N., Zatsarnyi V. V., Kashtanov S. F. et al. Occupational safety and industrial safety: textbook. – Kyiv: Libra, 2010. – 559 p.**
- 2.7. \*\* S.A. Gavrysh, A.S. Gavrysh. Occupational safety in the telecommunications industry: Textbook. – Kyiv: NTUU "KPI", 2011, 440 p.**
- 2.8. \*\*Batluk V.A. Occupational safety in telecommunications: Textbook. – Lviv: Afisha, 2003. – 320 p.**
- 2.9. Tkachuk K.N., Filipchuk V.L., Kashtanov S.F., Zatsarny V.V., Polukarov O.I. et al. Industrial Hygiene: Textbook. – Rivne: 2012. – 443 p.
- 2.10. Tkachuk K.N., Molchak Ya.O., Kashtanov S.F., Polukarov O.I. et al. Occupational Safety Management: Textbook. – Lutsk: 2012. – 287 p.
- 2.11. Tkachuk K.N., Yesypenko A.S., Filipchuk V.L., Polukarov O.I., et al. System of State Supervision of Industrial Safety and Labor Protection: Textbook. – Rivne: 2012. – 384 p.
- 2.12. Tkachuk K.N., Kalda G.S., Kashtanov S.F., Polukarov O.I. et al. Psychology of labor and its safety: Textbook. – Khmelnytsky: 2011. – 135 p.
- 2.13. \*\* Mikheev Yu.V., Prahovnik N.A., Zemlyanska O.V., Civil Protection: Textbook – Kyiv: Osnova, 2014. – electronic edition.**
- 2.14. Vasiychuk V.O., Goncharuk V.E., Kachan S.I., Mokhnyak S.M. Fundamentals of Civil Protection: Textbook / Lviv, 2010. – 384 p.
- 2.15. Mykhailiuk V.O., Khamuradov B.D. Civil Security: Textbook. – Kyiv: Center for Educational Literature, 2008. – 158 p.
- 2.16. Ruslovsky A.V., Vendychansky V.N. Civil Protection: Textbook / Edited by O.I. Zaporozhets, Kyiv: AMU, 2008, 250 p.

- 2.17. Civil Protection. Methodological guidelines for practical work: Mikheev Yu.V., Zemlyanska O.V. – K.: NTUU "KPI", 2016. – electronic publication. /http://ela.kpi.ua/kandle/123456789/3568/
- 2.18. Safety of life. Lecture notes lectures. Prakhovnik N.A., Zatsarny V.V., Zemlyanska O.V. – K.: NTUU "KPI" IEE, 2015. – electronic publication. /http://ela.kpi.ua/kandle/123456789/18956/
- 2.19. Practical work in the discipline "Occupational Safety and Civil Protection" for TEF students: [Electronic resource]: - Kyiv: NTUU "KPI", 2021. /website opcb.kpi.ua./
- 2.20. Laboratory work on the discipline "Occupational Safety and Civil Protection" for TEF students: [Electronic resource]: - K.: NTUU "KPI", 2021. /website opcb.kpi.ua./

### 4.3. Additional literature

- 3.1. DSTU 2293-99. Occupational safety. Terms and definitions of basic concepts.
- 3.2. Recommendations for organizing the work of the industrial safety and occupational safety office. Approved by the Head of the State Mining and Industrial Safety Inspectorate on January 16, 2008.
- 3.3. List of professions, industries, and organizations whose employees are subject to mandatory preventive medical examinations. Resolution of the Cabinet of Ministers of Ukraine No. 559 of May 23, 2001.
- 3.4. ILO Convention 187 "On the foundations that promote occupational safety and health."
- 3.5. ISO 9001 "Quality Management Systems".
- 3.6. ISO 14001 "Environmental Management Systems".
- 3.7. ISO 45001 "Occupational Health and Safety Management Systems."**
- 3.8. \*\* Procedure for investigating and recording accidents, occupational diseases, and industrial accidents. Resolution of the Cabinet of Ministers of Ukraine No. 337 dated April 17, 2019.**
- 3.9. DSTU ISO/IEC 17000:2007 "Conformity assessment. Vocabulary and general principles."
- 3.10. DSTU ISO/IEC 17007: 2009 "Guidelines for the preparation of normative documents suitable for use in conformity assessment."
- 3.11. Directive 89/391/EEC of the Council of the European Communities "On the introduction of measures to encourage improvements in the safety and health of workers at work."
- 3.12. Directive 2001/95/EC "On General Product Safety" / Directive 2001/95/EC "On General Product Safety – (GPSD)".
- 3.13. \*\*Directive 1999/5/EC (R & TTE Directive – Radio and Telecommunications Terminal Equipment and the Mutual Recognition of their Conformity) /Radio Equipment and Telecommunications Terminal Equipment and the Mutual Recognition of their Conformity: Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999. / Official Journal of the European Union — 7.04.1999. — L91. — pp. 10-28/.**
- 3.14. On Approval of Technical Regulations for Radio Equipment and Telecommunications Terminal Equipment: Resolution of the Cabinet of Ministers of Ukraine No. 679 of 08.06.2009. (as amended by Resolutions of the Cabinet of Ministers No. 613 of 11.07.2012, No. 235 of 08.04.2013, No. 446 of 15.05.2013, No. 632 dated 28.08.2013, No. 181 dated 08.04.2015).
- 3.15. \*\*Directive 2006/95/EC (LVD Directive – low voltage electrical equipment) / On the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits: Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006 / Official Journal of the European Union — 27.12.2006 — L 374. — pp. 10-19/.**
- 3.16. On approval of the Technical Regulation for low-voltage electrical equipment: Resolution of the Cabinet of Ministers of Ukraine No. 1149 of 29.10.2009. (as amended by Resolutions of the Cabinet of Ministers No. 810 of 29.08.2012, No. 235 of 08.04.2013 and No. 632 of 28.08.2013/.
- 3.17. \*\*Directive 2014/53/EU (RED Directive – radio equipment) /On the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits: Directive**

**2014/35/EU of the European Parliament and of the Council of 26 February 2014 / Official Journal of the European Union — 29.03.2014 — L 96. — pp. 357-374/.**

- 3.18. EN 50581:2012 "Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances."
- 3.19. \*\*Directive 2014/29/EU of the European Parliament and of the Council of February 26, 2014 on the harmonization of the laws of the Member States relating to the making available on the market of simple pressure vessels / Official Journal of the European Union — March 29, 2014. — L 96. — pp. 45-78.**
- 3.20. Resolution of the Cabinet of Ministers of Ukraine No. 785 of 29.07.2009 "On Approval of Technical Regulations on Electromagnetic Compatibility of Equipment" (as amended by Resolutions of the Cabinet of Ministers No. 631 of 20.06.2012, No. 235 of 08.04.2013, No. 632 of 28.08.2013).
- 3.21. Measuring instruments: Directive 2004/22/EC (MID) of the European Parliament and of the Council of March 31, 2004 / Official Journal of the European Union — April 30, 2004. — L 135. — pp. 1-80.
- 3.22. Directive 2002/96/EC (WEEE Directive — on waste electrical and electronic equipment) /On waste electrical and electronic equipment (WEEE): Directive 2002/96/EC of the European Parliament and of the Council of January 27, 2003. / Official Journal of the European Union — 13.02.2003. — L37. — pp. 24-38/.
- 3.23. Directive 2011/65/EU (RoHS Directive or RoHS2 – Restriction of the use of certain hazardous substances in electrical and electronic equipment) / On the restriction of the use of certain hazardous substances in electrical and electronic equipment: Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011. / Official Journal of the European Union — 01.07.2011. — L 174. — pp. 88-110/.
- 3.24. On approval of the Technical Regulation on the restriction of the use of certain hazardous substances in electrical and electronic equipment: Resolution of the Cabinet of Ministers of Ukraine No. 1057 of 03.12.2008.
- 3.25. EC Technical Regulation No. 1907/2006 (REACH Regulation — Registration, Evaluation, Authorisation, and Restriction of Chemicals) / Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) / This document is meant purely as a documentation tool and the institutions do not assume any liability for its contents — 2006R1907 — EN — 10.04.2014 — 018.001 — 1 — pp. 1-520/.
- 3.26. \*\*Technical Regulation EU No. 2016/425 (PPE Regulation — personal protective equipment) /Regulation (EU) No 2016/425 of the European Parliament and of the Council of 9 March 2016 on personal protective equipment and repealing Council Directive 89/686/EEC / Official Journal of the European Union — 31.03.2016. — L 81. — pp. 51-98/.**
- 3.27. On Approval of Technical Regulations for Personal Protective Equipment: Resolution of the Cabinet of Ministers of Ukraine No. 761 dated August 27, 2008 (as amended by Resolutions of the Cabinet of Ministers No. 777 (7772011п) dated July 20, 2011; No. 235 (2352013п) dated April 8, 2013; No. 632 (6322013п) dated August 28, 2013; N 76 ( 762016п) dated February 11, 2016).
- 3.28. DSanPin 3.3.6.096-2002. State sanitary norms and rules for working with sources of electromagnetic fields. – Kyiv: Ministry of Health of Ukraine, 2002. – 45 p.
- 3.29. State sanitary norms and rules for the protection of the population from the effects of electromagnetic radiation: approved by order of the Ministry of Health of Ukraine dated 01.08.96 No. 239, registered with the Ministry of Justice of Ukraine on 29.08.1996.
- 3.30. DSTU IEC 60825-1:2004 "Safety of laser products. Classification of equipment, requirements and instructions for use."
- 3.31. \*\* PUE-2017 "Rules for the installation of consumer electrical installations."**
- 3.32. NPAOP.40.1-1.21-98 "Rules for the safe operation of consumer electrical installations."

- 3.33. \*\*NPAOP 40.1-1.32-01 "Rules for the construction of electrical installations. Electrical equipment for special installations."**
- 3.34. DSTU EN 50014-2001 "Electrical apparatus for potentially explosive atmospheres. General requirements."
- 3.35. IEC 364-4-41-92 "Protection against electric shock."
- 3.36. IEC 364-4-47-81 "Requirements for the application of means of protection against electric shock."
- 3.37. \*\*DSTU EN 61140:2015 "Protection against electric shock. General aspects for installations and equipment (EN 61140:2002, IDT)".**
- 3.38. IEC 60364-4-42:2014 "Low-voltage electrical installations. Protection for safety. Protection against thermal effects" - /Low-voltage electrical installations. Basic provisions, assessment of general characteristics, terms and definitions/.
- 3.39. DBN V.2.5-38:2008 (IEC 62305:2006 NEQ) "Lightning protection of buildings and structures."
- 3.40. DBN V.2.5-27:2006 "Electrical safety measures in electrical installations of buildings and structures."
- 3.41. \*\*Requirements for ensuring the protection of workers' health when working with screen devices: Order of the Ministry of Social Policy of Ukraine dated February 14, 2018, No. 207, registered with the Ministry of Justice of Ukraine on April 25, 2018, No. 508/31960/.**
- 3.42. \*\*State sanitary rules and regulations for working with visual terminals of electronic computers – DSanPiN 3.3.2.007-98: approved by the resolution of the Chief State Sanitary Doctor of Ukraine dated December 10, 1998, No. 7.**
- 3.43. DSTU ISO 9241-3-2001\_Ergonomic requirements for working with video terminals in the office. Part 3. Requirements for video terminals (ISO 9241-31992, IDT).
- 3.44. DSTU ISO 9241-6-2004 "Ergonomic requirements for working with video terminals in the office. Part 6. Requirements for the working environment."
- 3.45. DSTU ISO 11064-6:2013 Ergonomic design of control centers. Part 6. Requirements for the environment of control centers (ISO 11064-6:2005, IDT).
- 3.46. EN ISO 12100-1/2 "Safety of machinery General principles for design and risk evaluation. Basic concepts."
- 3.47. IEC 62061 Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems.
- 3.48. IEC 61508 (all parts) "Functional safety electrical/electronic/programmable electronic safety-related systems".
- 3.49. DSTU EN 954-1 "Safety of machinery. Safety elements of control systems. Part 1 - General principles for design."
- 3.50. ISO 13849-1 "Safety of machinery. Safety-related parts of control systems. Part 1 - General principles for design."
- 3.51. IEC62061 "Safety equipment. Functional safety of for electrical, electronic, and programmable electronic safety-related control systems."
- 3.52. IEC 61508-1-2010 "Functional safety of safety-related electrical, electronic, and programmable electronic systems."
- 3.53. \*\* "List of high-risk works." Resolution of the Cabinet of Ministers of Ukraine No. 48 of February 7, 2018.**
- 3.54. NPAOP 0.00-4.12-05 "Model provisions on the procedure for training and testing knowledge on occupational safety issues."
- 3.55. NPAOP 0.00-6.03-93 "Procedure for the development and approval by the owner of regulatory acts on occupational safety applicable at the enterprise."
- 3.56. DBN V.2.5-76:2014 "Automated systems for early detection of threats of emergencies and alerting the population."
- 3.57. \*\*NAPB A.01.001-2014 Fire safety rules in Ukraine. Order dated 30.12.2014 No. 1417.**
- 3.58. DSTU 2272-2006. Fire safety. Terms and definitions of basic concepts.

- 3.59. DSTU ISO 6309:2007 "Fire protection. Safety signs."
- 3.60. DSTU ISO 16069:2012 "Fire safety. Graphic symbols. Safety signs. Safe evacuation marking systems" (ISO 16069:2004, IDT).
- 3.61. \*\*DBN V.2.5-56-2014 "Fire protection systems."**
- 3.62. DSTU B.V.1.1-36:2016 "Determination of categories of premises, buildings, and outdoor structures according to explosion and fire hazard."
- 3.63. DBN V.2.5-28-2006. Natural and artificial lighting.
- 3.64. DBN V.2.5-28-2006. Natural and artificial lighting.
- 3.65. DSN 3.3.6.039-99. "State sanitary standards for general and local vibrations in the workplace." – Kyiv: Ministry of Health of Ukraine, 2000.– 45 p.
- 3.66. DSN 3.3.6.037-99. "State sanitary standards for industrial noise, ultrasound, and infrasound." – Kyiv: Ministry of Health of Ukraine, 2000. – 29 p.
- 3.67. DSN 3.3.6.042-99 "State sanitary standards for microclimate parameters." – Kyiv: Ministry of Health of Ukraine, 2000.

#### 4.4. Internet information resources

- 4.1. <http://www.dnop.kiev.ua> - Official website of the State Committee of Ukraine for Industrial Safety, Labor Protection, and Mining Supervision (Derzhpratsi).
- 4.2. \*\* <http://www.mns.gov.ua> - Official website Ministry of Emergency Situations of Ukraine.
- 4.3. <http://www.social.org.ua> - Official website of the Social Insurance against Industrial Accidents and Occupational Diseases of Ukraine.
- 4.4. <https://www.ilo.org/global/lang--en/index.htm> – International Organization for Occupational Safety and Health.
- 4.5. <http://www.nau.ua> – Information and search legal system "Regulatory Acts of Ukraine (NAU)".
- 4.6. <http://www.opcb.kpi.ua> – Information resources of the Department of Occupational Safety and Health of the Igor Sikorsky Kyiv Polytechnic Institute.

### Educational content

## 5. Methodology for mastering the academic discipline (educational component)

### 5.1 Lectures

No No	Lecture topic and list of main questions
1	<p><b>Lecture 1.</b>  <b>Section 1. Life safety.</b>  <b>Topic 1.1. Categorical and conceptual apparatus of life safety.</b>            Key definitions – safety, threat, danger, emergency, risk. Human safety, social safety, national security. Safety culture as an element of general culture that fulfills the protective function of humanity. Methodological foundations of life safety. A systematic approach to life safety. Types of dangers. Classification of dangers.  <i>Literature:</i> L1.1; L1.6; L1.9-L1.11; L1.18; L1.21-L1.23; L2.1-L2-2; L2.18.</p>
2	<p><b>Lecture 2.</b>  <b>Topic 1.2. Risk as a quantitative assessment of hazards.</b>            Risk as a quantitative assessment of hazards. Individual and group risk. Classification (identification) of risks. Risk management options. General analysis of risks and safety issues in complex systems involving people (managers, operators, staff, population). Methodological approaches to risk assessment. The concept of acceptable risk.  <i>Literature:</i> L1.18; L2.1-L2-2; L2.18; L3.46-L3.52.</p>

3	<p><b>Lecture 3.</b></p> <p><b>Section 2. Occupational safety.</b></p> <p><b>Topic 2.1. Introduction. Legal and organizational foundations of occupational safety.</b></p> <p>Occupational safety as a component of life safety. Structure of occupational safety. Basic terms and definitions in the field of occupational safety. Classification of harmful and hazardous production factors.</p> <p>Conventions and Recommendations of the International Labour Organization (ILO) in the field of occupational safety. Legislative framework of the European Union on occupational safety. Occupational safety as part of EU social policy. EU directives on occupational safety.</p> <p>Constitutional principles of occupational safety in Ukraine. Ukrainian legislation on occupational safety. Law of Ukraine "On Occupational Safety." Basic principles of Ukrainian state policy in the field of occupational safety. Guarantees of workers' rights to occupational safety, benefits, and compensation for difficult and harmful working conditions. Employees' obligations to comply with occupational safety regulations.</p> <p>Responsibility of officials and employees for violations of occupational safety legislation.</p> <p>Regulatory and legal acts on occupational safety (NPAOP): definition, basic requirements and characteristics. Structure of NPAOP. Register of NPAOP.</p> <p>Standards in the field of occupational safety. Interstate, state, inter-industry, and industry standards for occupational safety. Technical regulations for the safety of industrial equipment and products. Sanitary and construction standards and other national documents on occupational safety.</p> <p>Occupational safety instructions. Development and approval of occupational safety regulations applicable in the organization.</p> <p>Mandatory medical examinations for certain categories of employees.</p> <p><i>Literature:</i> L1.1-L1.4; L1.7-L1.12; L1.15-L1.17; L2.4-L2.12; L3.1; L3.4; L3.7; L3.11; L4.1.</p> <p><b>Topic 2.2. State management of occupational safety , state supervision and public control over occupational safety.</b></p> <p>System of state management of occupational safety in Ukraine. Competence and powers of state occupational safety management bodies.</p> <p>State occupational safety supervision bodies, their main powers and rights. Public control over compliance with occupational safety legislation.</p> <p><i>Literature:</i> L1.2-L1.4; L1.16; L2.4-L2.12; L3.7; L4.1; L4.4-L4.6.</p>
4	<p><b>Lecture 4.</b></p> <p><b>Topic 2.3. Training on occupational safety issues.</b></p> <p>Principles of organization and types of training on occupational safety issues. Studying the basics of occupational safety in educational institutions and during vocational training. Training and testing of employees' knowledge of occupational safety issues during recruitment and in the course of work. Special training and testing of knowledge of occupational safety issues for employees performing high-risk work. Training on occupational safety issues for officials.</p> <p>Instruction on occupational safety. Types of instruction. Procedure for conducting instruction for employees. Instruction on occupational safety for pupils, students, and trainees.</p> <p>Internships (shadowing) and admission of employees to independent work.</p> <p><i>Literature:</i> L1.2-L1.3; L1.17; L2.4-L2.11; L3.2; L3.7; L3.54; L4.1; L4.3-L4.5.</p>

	<p><b>Topic 2.4. Occupational safety management system in an organization.</b>  Existing regulatory framework. Basic requirements for the development and operation of an occupational health and safety management system (OHSMS). Ensuring the operation and development of an OHSMS within an organization. Regulations on OHSMS, structure, and content of its sections.</p> <p>Elements of the occupational health and safety management system, international standards OHSAS 18001:2007 and ISO 45001:2018. Occupational health and safety policy. Planning. Implementation and operation of the OHMS. Audits and corrective actions. Management review.</p> <p>Occupational health and safety service. Status and subordination.</p> <p>Main tasks and functions of the occupational health and safety service. Structure and size of occupational health and safety services.</p> <p>Rights and responsibilities of occupational health and safety service employees.</p> <p>Public control over the state of occupational health and safety in the organization. Persons authorized by employees on occupational health and safety issues, their duties and rights.</p> <p>Enterprise occupational safety commission. Main tasks and rights of the commission.</p> <p>Regulation of occupational safety issues in the collective agreement.</p> <p>Promotion of occupational safety.</p> <p><i>Literature:</i> L1.1-L1.3; L2.4-L2.12; L3.2; L3.4-L3.8; L4.1; L4.3-L4.6.</p>
5	<p><b>Lecture 5.</b>  <b>Topic 2.5. Prevention of injuries and occupational diseases.</b>  <b>Investigation of accidents.</b></p> <p>General provisions and definitions. Occupational injuries, occupational diseases, industrial accidents. The purpose and objectives of preventing accidents, occupational diseases, and poisoning in the workplace. The main causes of occupational injuries and diseases. Classification of injuries by severity. Basic measures for preventing injuries and occupational diseases.</p> <p>Methods of research and analysis of occupational injuries.</p> <p>The purpose and objectives of accident investigation. Employer's responsibilities for accident investigation. Circumstances under which an investigation is conducted.</p> <p>Establishing a link between an accident and production.</p> <p>Investigation and recording of accidents, chronic occupational diseases, and poisoning in the workplace.</p> <p>Organization of investigations, composition of investigation commissions, main documents.</p> <p>Special investigations. Investigation and recording of accidents.</p> <p>Features of investigating and recording non-work-related accidents.</p> <p><i>Literature:</i> L1.2; L1.7; L2.6-L2.11; L3.8; L4.1; L4.3-L4.5.</p>
6	<p><b>Lecture 6.</b>  <b>Topic 2.6. Social insurance against accidents and occupational diseases at work.</b></p> <p>The purpose of accident insurance. Principles and types of insurance. Subjects and objects of insurance. Insurance risk and insured event. Main functions and powers of the Social Insurance Fund for Accidents. Obligations and rights of accident insurance subjects.</p> <p><i>Literature:</i> L1.2; L1.7; L2.6-L2.11; L3.7; L4.1; L4.3-L4.5.</p> <p><b>Topic 2.7. Fundamentals of occupational health and industrial hygiene.</b></p> <p>Factors determining sanitary and hygienic working conditions. General approaches to assessing working conditions and ensuring adequate, safe, and healthy working conditions.</p> <p>Hygienic classification of working conditions.</p>

	<p>Requirements for the use of personal and collective protective equipment.  <i>Literature:</i> L1.2-L1.4; L1.9; L2.4-L2.11; L3.4; L3.26-L3.27; L4.1; L4.3-L4.5.</p>
7	<p><b>Lecture 7</b>  <b>Topic 2.11. Electromagnetic fields and radiation.</b>  Sources, characteristics, and classification of electromagnetic fields and radiation. Characteristics of electromagnetic fields and radiation. Standardization of electromagnetic fields.  <i>Literature:</i> L2.6-L2.8; L3.28-L3.29; L3.42; L4.1; L4.3-L4.5.</p>
8	<p><b>Lecture 8.</b>  <b>Topic 2.11. Electromagnetic fields and radiation (continued).</b>  Features of standardization of radio frequency electromagnetic radiation for the population. Methods for calculating electromagnetic field levels in the workplace. Protection from electromagnetic fields and radiation.  <i>Literature:</i> L2.6-L2.8; L3.28-L3.29; L3.42; L4.1; L4.3-L4.5.</p>
9	<p><b>Lecture 9.</b>  <b>Topic 2.15. Organization of workplaces and their certification according to working conditions. Certification of production facilities.</b>  Organization and certification of workplaces according to working conditions. Purpose, main tasks, and content of certification. Procedure for certifying workplaces according to working conditions. Passportization of production facilities. Working conditions map.  <i>Literature:</i> L1.2-L1.4; L2.4-L2.9; L3.7; L3.41-L3.45; L4.1; L4.3-L4.5.</p>
10	<p><b>Lecture 10.</b>  <b>Topic 2.16. Occupational and industrial safety. Current European legislation in the field of safety of production equipment and products.</b>  Key regulatory and legal documents on occupational and industrial safety in the field of telecommunications and radio engineering.  Features of the application of European legislation on the safety of production equipment and products. EU directives, technical regulations, the procedure for assessing the conformity of industrial equipment and products, their certification and notification.  Compliance with existing requirements of EU Directives and Technical Regulations regarding the safety of equipment and of products in the field information technology (telecommunications, radio and electronic equipment), restrictions on the use of hazardous substances in electrical and electronic equipment and their subsequent disposal, manufacturers' responsibility for the disposal and recycling of electronic products and their components, features of the REACH system: registration /Registration/, evaluation /Evaluation/, authorization /Authorisation, and restrictions /Restriction/ of chemicals, etc.  Colors, safety signs, and warning markings. List of high-risk jobs.  <i>Literature:</i> L2.4-L2.12; L2.13; L3.7; L3.12; L3.30-L3.40; L3.53; L4.1; L4.3-L4.5.</p>
11	<p><b>Lecture 11.</b>  <b>Topic 2.17. Electrical safety.</b>  The effect of electric current on the human body. Factors affecting the consequences of electric shock. Causes of electrical injuries. Classification of premises according to the degree of danger of electric shock to personnel.  First aid for electric shock. Systems of means and measures for the safe operation of electrical equipment.  Technical means for the safe operation of electrical equipment during normal operation. Requirements for working insulation. Control and testing methods.  <i>Literature:</i> L2.4-L2.8; L3.15-L3.16; L3.31-L3.40; L4.1; L4.3-L4.5.</p>

12	<p><b>Lecture 12.</b>  <b>Topic 2.17. Electrical safety (continued).</b>  Technical means for the safe operation of electrical installations when voltage is transferred to normally non-current-carrying parts of electrical equipment. Protective grounding (IT, TT, TN systems and TN-C, TN-S, TN-C-S subsystems). Protective devices.  Classification of electrical equipment by electrical protection.  IP classification of electrical equipment according to the level of protection against dust and moisture. Classification of electrical equipment according to explosion protection.  Methods and means of protection against static electricity. Lightning protection of industrial facilities and equipment.  <i>Literature:</i> L2.4-L2.8; L3.15-L.3.16; L3.31-L3.40; L4.1; L4.3-L4.5.</p>
13	<p><b>Lecture 13.</b>  <b>Topic 2.18.</b> Safety requirements for the design, manufacture, installation, testing, and operation of RTOs, telecommunications systems and networks, Wi-Fi devices, and laser equipment.  Compliance with safety requirements during installation, testing, and operation of RTO.  Compliance with safety requirements when using Wi-Fi and laser technologies in telecommunications and computer equipment, artificial intelligence systems, household radio-electronic equipment, etc.  Features of the effect of laser radiation on humans. Standardized parameters of laser radiation sources (frequency range, light flux power density). Current classification of laser radiation sources by degree of danger.  Ensuring compliance with modern safety requirements for electronic system software that implements safety-related control functions (SRCF).  <i>Literature:</i> L2.6-L2.8; L3.13-L.3.24; L3.28-L3.30; L4.1; L4.3-L4.5.</p>
14	<p><b>Lecture 14.</b>  <b>Topic 2.20. Ensuring that environmental parameters comply with safety requirements when organizing workplaces for users of computer terminals in offices and automated workplaces.</b>  Regulatory acts and safety standards for the use of computer equipment.  Basic guidelines of ISO 9241-6 for ensuring that environmental parameters (light, sound, vibration, electromagnetic, temperature, space) comply with safety requirements when organizing workplaces for users of computer displays in offices and automated workplaces.  <i>References:</i> L2.4-L2.8; L3.41-L.3.45; L4.1; L4.3-L4.5.</p>
15	<p><b>Lecture 15.</b>  <b>Section 3. Civil protection.</b>  <b>Topic 3.1.</b> Legislative and regulatory framework for civil protection.  The existing regulatory framework governing the organizational structure of the emergency management and protection system in emergencies (ES) and during wartime.  Definition of key terms in the Civil Protection Code: accident, fire, epidemic, disaster, high-risk facility, evacuation, fire protection, natural disaster, civil protection measures, emergency rescue team, etc.  Classification and types of emergencies (technogenic, natural, social, military).  <i>Literature:</i> L1.5-L1.6; L1.10-L1.13; L1.20-L1.23; L2.13-L2.16; L4.2.</p>
16	<p><b>Lecture 16.</b>  <b>Topic 3.2.</b> Protection systems in emergency situations and during wartime. Organizational and functional structure of protection personnel of</p>

	<p>management facilities and the population in emergency situations and during wartime Civil protection entities. Basic principles of civil protection.</p> <p>Modes of operation of the unified state civil protection system.</p> <p>Tasks and responsibilities of economic entities and local self-government bodies in the field of civil protection.</p> <p>Rights and responsibilities of citizens in the field of civil protection.</p> <p>Composition and main tasks of civil protection forces in emergency situations and martial law.</p> <p><i>Literature:</i> L1.5; L1.20-L1.22; L2.13-L2.16; L4.2.</p>
17	<p><b>Lecture 17.</b></p> <p><b>Topic 3.3.</b> Fire protection. Fire safety and prevention at facilities in the industry.</p> <p>Existing regulatory framework in the field of fire safety.</p> <p>Indicators of explosion and fire hazard of materials and substances. Fire classes.</p> <p>Classification of premises and work areas according to explosion and fire hazard.</p> <p>Provision and control of fire protection .</p> <p>Primary fire extinguishing equipment. Automatic fire alarm, fire extinguishing, and smoke removal systems.</p> <p>Responsibilities and actions of citizens in the event of a fire.</p> <p><i>Literature:</i> L1.2; L1.5; L2.4-L2.16; L3.57-L3.62; L4.2.</p>
18	<p><b>Lecture 18.</b></p> <p><b>Topic 3.4.</b> Elimination of the consequences of emergencies. Training of personnel of enterprises, institutions, and organizations, as well as the population, on actions to take in emergencies and during wartime.</p> <p>Plans for localizing and eliminating emergency situations. Levels of industrial accidents depending on their scale. Organization of work to eliminate the consequences of emergencies. Conducting emergency rescue and other urgent work.</p> <p>Training of personnel of enterprises, institutions, and organizations, as well as the population, in actions and methods of protection in the event of an emergency (accidents, fires, explosions, etc.).</p> <p>System of conducting briefings. Programs for training personnel of economic entities and the population to act in emergencies and during wartime.</p> <p><i>Literature:</i> L1.5-L1.6; L1.11-L1.13; L1.20-L1.23; L2.13-L2.16; L4.2.</p> <p><b>Topic 3.5. Alerting, evacuation, and protection of personnel at economic facilities and the population in the event of an emergency and during wartime.</b></p> <p>Existing requirements for the organization and operation of warning and evacuation systems for personnel at economic facilities and the population in the event of an emergency.</p> <p>Automatic personnel alert systems (audible, visual, and voice alerts).</p> <p>Evacuation routes and plans.</p> <p>Responsibilities and actions of personnel at economic facilities and the population in the event of evacuation during an emergency.</p> <p>Sheltering of personnel at economic facilities and the population in civil defense shelters.</p> <p>Alerting and informing in the field of civil protection during martial law and states of emergency.</p> <p><i>Literature .</i> L1.5; L1.20-L1.21; L2.13-L2.16; L3.59-L3.61; L4.2.</p>

## 5.2 Practical classes

The main objectives of the practical training cycle are to deepen knowledge on specific topics of the lecture material and issues studied independently, to develop skills in assessing hazardous and harmful factors, damaging factors and their impact on human health, to develop risk strategies to reduce the likelihood of risk realization and minimize possible

negative consequences, providing first aid, and conducting evacuation measures. During the practical classes, an interactive environment is created that will promote the development of creative thinking, problem-solving skills, and practical skills in students.

No. No	<i>Title of the practical class and list of main questions</i>
1	<p><b>PRACTICAL CLASS №1</b> "Methods for calculating the intensity levels of electromagnetic fields in the workplace."</p> <p><b>The purpose of this work</b> is to acquire the necessary practical skills to perform a preliminary assessment of the compliance of electromagnetic radiation levels in the workplace with current sanitary standards.</p> <p><i>SRS: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
2	<p><b>PRACTICAL CLASS № 2</b> "Determination of sanitary protection zones for radio engineering facilities (REF)".</p> <p><b>The purpose of this work</b> is to acquire the necessary practical skills to determine sanitary protection zones for radio engineering facilities (REF).</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
3	<p><b>PRACTICAL CLASS № 3</b> "Calculation of the concentration of harmful substances in the air of the working area when using the soldering process."</p> <p><b>The purpose of this work:</b> to acquire the necessary practical skills for calculating the concentration of harmful substances in the air of the working area when using the soldering process.</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
4	<p><b>PRACTICAL CLASS No. 4</b> "Compliance of the technological process soldering radio components to safety requirements."</p> <p><b>The purpose of this work:</b> to acquire the necessary practical skills to ensure that the parameters of the technological process of soldering radio components comply with safety requirements.</p> <p><i>SRS: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
5	<p><b>PRACTICAL CLASS № 5</b> "Protective grounding in electrical installations"</p> <p><b>The purpose of this work:</b> to acquire the necessary practical skills in the field of electrical safety regarding the ability to apply existing protective grounding systems in electrical installations (EI) in accordance with the requirements of PUE-2017.</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
6	<p><b>PRACTICAL CLASS № 6</b> "Protective grounding of the TN system (TN-C subsystem) in electrical installations with a voltage of up to 1 kV."</p> <p><b>The purpose of this work</b> is to acquire the necessary practical skills in the field of electrical safety regarding the ability to apply protective grounding of the TN system (TN-C subsystem) in electrical networks with a voltage of up to 1 kV in accordance with the requirements of PUE-2017.</p> <p><i>Requirements: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>

7	<p><b>PRACTICAL CLASS № 7</b> "Ensuring the compliance of industrial frequency electromagnetic field intensity in the workplace with sanitary standards." <b>The purpose of this work:</b> to acquire the necessary practical skills to ensure the compliance of industrial frequency electromagnetic field intensity in the workplace with sanitary standards.</p> <p><i>SRS: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
8	<p><b>PRACTICAL CLASS № 8</b> "Assessment of the required level of operational safety of machines and mechanisms, their control and monitoring systems for the parameters of risk of dangerous situations." <b>The purpose of this work</b> is to acquire the necessary practical skills to perform a preliminary assessment of the required level of safety of the designed machines and mechanisms, their control and monitoring systems, depending on the risk parameters of dangerous situations that may occur during their operation.</p> <p><i>SRS: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
9	<p><b>PRACTICAL CLASS № 9</b> "Algorithm for identifying, assessing, and reducing the risks of hazardous situations in production." <b>The purpose of this work:</b> to acquire the necessary practical skills to use the existing algorithm for identifying, assessing, and reducing the risks of hazardous situations in production.</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
10	<p><b>PRACTICAL CLASS № 10</b> "Methods of analyzing production risks, injuries, and occupational diseases." <b>The purpose of this work</b> is to acquire the necessary practical skills to apply existing methods of analyzing occupational risks, injuries, and occupational diseases.</p> <p><i>Independent work: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
11	<p><b>PRACTICAL CLASS № 11</b> "Selecting the type and model of fire extinguishers and determining their quantity and capacity to ensure the necessary level of fire safety at industrial facilities." <b>The purpose of this work</b> is to acquire the necessary practical skills for selecting the type and model of fire extinguishers and determining their quantity and capacity to ensure the required level of fire safety at industrial facilities.</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
12	<p><b>PRACTICAL CLASS № 12</b> "Providing first aid in case of electric shock." <b>The purpose of this work</b> is to acquire the necessary practical skills to <b>provide</b> first aid in case of electric shock, as well as in emergency situations (burns, radiation contamination, poisoning, etc.) and in wartime (gunshot wounds, shrapnel wounds, concussions, etc.).</p> <p><i>SRS: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>

13	<p><b>PRACTICAL CLASS № 13</b> "Methods for calculating the intensity levels of electromagnetic fields in workplaces when using WiFi technologies."</p> <p><b>The purpose of this work:</b> to acquire the necessary practical skills to assess the compliance of EMF levels in the workplace with current health standards when using WiFi technologies.</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>
14	<p><b>PRACTICAL CLASS № 14</b> "Compliance with civil protection requirements when organizing a personnel alert system and its evacuation in the event of an emergency and under martial law"</p> <p><b>The purpose of this work:</b> to acquire the necessary practical skills to comply with civil protection requirements when organizing a personnel alert and evacuation system in the event of an emergency and under martial law.</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, and formulate conclusions.</i></p> <p>Literature: L2.21. /website opcb.kpi.ua/.</p>

### 5.3 Laboratory work

The main tasks of the laboratory work cycle: to teach students the means and methods of researching the parameters of the production environment and the labor process, identifying harmful and dangerous production factors, and evaluating measures aimed at their normalization and occupational safety.

The following topics for laboratory work are recommended (4 laboratory sessions are planned, 2 academic hours each).

No	Name of laboratory work	Number of academic hours
1	<p><b>LABORATORY WORK No. 1</b> "Features of the use of protective safety devices in machine and mechanism control systems"</p> <p><b>The purpose of this work:</b> to acquire the necessary practical skills for the ability to use protective safety devices in machine and mechanism control systems.</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, study the research results, and formulate conclusions.</i></p> <p>Literature: L2.22. /website opcb.kpi.ua/.</p>	2
2	<p><b>LABORATORY WORK No. 2</b> "Signaling devices in machine and mechanism safety control systems"</p> <p><b>The purpose of this work:</b> to acquire the necessary practical skills regarding the features of using signaling devices in machine and mechanism safety control systems.</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, study the research results, and formulate conclusions.</i></p> <p>Literature: L2.22. /website opcb.kpi.ua/.</p>	2
3	<p><b>LABORATORY WORK No. 3</b> "Protective grounding in electrical installations"</p> <p><b>The purpose of this work:</b> to familiarize yourself with the existing types of protective grounding systems in electrical networks and to acquire practical skills in determining the operating parameters of such systems.</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, study the research results, and formulate conclusions.</i></p> <p>Literature: L2.22. /website opcb.kpi.ua/.</p>	2

4	<p><b>LABORATORY WORK No. 4</b> "Investigation of step voltage in the current spreading zone of a grounding device"</p> <p><b>The purpose of this work</b> is to familiarize students with the peculiarities of step voltage distribution in the current spreading zone of a grounding device and to acquire the necessary practical skills regarding the peculiarities of applying existing protection methods.</p> <p><i>SRC: study the theoretical provisions, complete the tasks according to the option, study the research results, and formulate conclusions.</i></p> <p>Literature: L2.22. /website opcb.kpi.ua/.</p>	2
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## 6. Independent work

Independent work by students involves deepening their knowledge of specific topics in preparation for practical classes and laboratory work (see table below), as well as studying lecture materials and preparing for the test.

No No	Title of the topic for independent study	Number of hours of independent work
1	<p><b>Section 1. Life safety.</b></p> <p><b>Topic 1.3. Classification of injuries and provision of first aid.</b></p> <p>Classification of injuries depending on the type of activity of the victim, degree of severity, influencing factors, and form of manifestation. The importance of providing first aid to preserve the health and life of the victim. The procedure for providing first aid in various situations.</p> <p><i>Literature: L2.17-L2.18; L4.2; L4.6.</i></p>	1
2	<p><b>Section 2. Occupational safety.</b></p> <p><b>Topic 2.8. Air in the work area.</b></p> <p>Work area and air in the work area. Microclimate of the work area. Standardization and control of microclimate parameters. Measures and means of normalizing microclimate parameters.</p> <p>Composition of the air in the working area: sources of air pollution with harmful substances (gases, vapors, dust, smoke, microorganisms). Maximum permissible concentrations (MPC) of harmful substances according to current standards. Control of the air environment in production. Measures and means of preventing air pollution in the working area.</p> <p>Ventilation. Types of ventilation. Organization of air exchange in rooms, air balance, air exchange rate. Natural ventilation. Artificial (mechanical) ventilation systems, their selection, design. Local (localized) mechanical ventilation.</p> <p><i>Literature: L2.4-L2.9; L4.1; L3.66; L4.3-L4.5.</i></p>	2
3	<p><b>Topic 2.9. Lighting of industrial premises.</b></p> <p>Current regulatory framework. Basic lighting definitions. Natural, artificial, and combined lighting. Classification of industrial lighting. Basic requirements for industrial lighting. Standardization of lighting levels in the workplace. Operation of industrial lighting systems. Sources of artificial lighting, lamps, and luminaires. General approaches to lighting system design.</p> <p><i>Literature: L2.4-L2.9; L3.63; L4.1; L4.3-L4.5.</i></p>	1

4	<p><b>Topic 2.10. Noise, ultrasound, infrasound, vibrations.</b></p> <p>Sound field parameters: sound pressure, intensity, sound level, frequency. Sound power of a sound source. Classification of noise by origin, nature, spectrum, and time characteristics. Noise regulation. Noise parameter control. Methods and means of collective and individual protection against noise.</p> <p>Infrasound and ultrasound. Sources and parameters of infrasound and ultrasonic vibrations. Standardization and control of levels, basic methods and means of protection against ultrasound and infrasound. Sources, classification, and characteristics of vibrations. Hygienic regulation of vibrations. Methods of vibration parameter control. Typical measures and means of collective and individual protection against vibrations.</p> <p><i>Literature:</i> L2.4-L2.9; L3.65; L4.1; L4.3-L4.5.</p>	0.5
5	<p><b>Topic 2.11. Electromagnetic fields and radiation.</b></p> <p>Sources, characteristics, and classification of electromagnetic fields and radiation. Characteristics of electromagnetic fields and radiation. Regulation of electromagnetic fields. Features of regulation of electromagnetic radiation in the radio frequency range. Methods for calculating electromagnetic field levels in the workplace. Control devices and methods. Protection from electromagnetic fields and radiation.</p> <p><i>Literature:</i> L2.6-L2.8; L3.28-L3.29; L3.42; L4.1; L4.3-L4.5.</p>	3.5
6	<p><b>Topic 2.12. Ionizing radiation.</b></p> <p>Sources of ionizing radiation, classification and features of their use. Principles of ionizing radiation regulation. Typical methods and means of protecting personnel from the negative effects of ionizing radiation in industrial conditions.</p> <p><i>Literature:</i> L1.11-L1.13; L2.4-L2.8; L4.1; L4.3-L4.5.</p>	0.5
7	<p><b>Topic 2.13. Optical range radiation.</b></p> <p>Classification and sources of optical range radiation. Features of infrared (IR) and ultraviolet (UV) radiation, their standardization, control methods.</p> <p>Means and measures of protection against IR and UV radiation.</p> <p><i>Literature:</i> L2.6-L2.8; L3.42; L3.66; L4.1; L4.3-L4.5.</p>	0.5
8	<p><b>Topic 2.14. Laser radiation.</b></p> <p>Features of the effect of laser radiation on humans. Standardized parameters of laser radiation sources (frequency range, light flux power density). Classification of laser radiation sources. Standardization principles. Control methods.</p> <p>Methods of protection against laser radiation.</p> <p><i>Literature:</i> L2.6-L2.8; L3.30; L4.1; L4.3-L4.5.</p>	0.5
9	<p><b>Topic 2.18.</b> Safety requirements for the operation of RTOs, telecommunications systems and networks, Wi-Fi equipment, and laser equipment.</p> <p>Organization of sanitary protection zones for RTO.</p> <p>Compliance with safety requirements when using Wi-Fi and laser technologies in telecommunications and computer equipment, artificial intelligence systems, and household radio-electronic equipment.</p> <p><i>Literature:</i> L2.6-L2.8; L3.28-L3.30; L4.1; L4.3-L4.5.</p>	2

10	<p><b>Topic 2.19.</b> Safety during gas-hazardous work in cable wells and underground telecommunications network structures.</p> <p><i>Literature:</i> L2.6-L2.8; L4.1; L4.3-L4.5.</p>	2
11	<p><b>Section 3. Civil protection.</b></p> <p><b>Topic 3.1.</b> Legislative and regulatory framework for civil protection.</p> <p>The existing regulatory framework governing the organizational structure of the emergency management and protection system.</p> <p>Law of Ukraine "On High-Risk Facilities."</p> <p>Law of Ukraine "On Industrial Safety." Hazardous production facilities.</p> <p>Law of Ukraine "On Fire Safety."</p> <p>Law of Ukraine "Civil Protection Code of Ukraine" (CPCU).</p> <p><i>Literature:</i> L1.5-L1.6; L1.10-L1.13; L1.20-L1.23; L2.13-L2.16; L4.2.</p>	2
12	<p><b>Topic 3.2.</b> Protection systems in emergency situations and during wartime.</p> <p>Tasks and responsibilities of business entities and local self-government bodies in the field of civil protection.</p> <p>Rights and responsibilities of citizens in the field of civil protection.</p> <p><i>Literature:</i> L1.5; L1.20-L1.22; L2.13-L2.16; L4.2.</p>	2
13	<p><b>Topic 3.3.</b> Fire protection. Fire safety and prevention at industry facilities.</p> <p>Regulatory and legal framework for fire safety.</p> <p>Explosion and fire hazard indicators for materials and substances.</p> <p>Fire classes. Classification of premises and work areas according to explosion and fire hazard. Primary fire extinguishing equipment.</p> <p>Responsibilities and actions of personnel in the event of a fire.</p> <p><i>Literature:</i> L1.2; L1.5; L2.4-L2.16; L3.57-L3.62; L4.2.</p>	4
14	<p><b>Topic 3.5. Alerting, evacuation, and protection of personnel at economic facilities and the population in the event of an emergency and during wartime.</b></p> <p>Features of the organization of warning systems. Evacuation routes and plans.</p> <p>Responsibilities and actions of personnel at economic facilities and the population in the event of evacuation during an emergency.</p> <p><i>Literature:</i> L1.5; L1.20-L1.21; L2.13-L2.16; L3.59-L3.61; L4.2.</p>	8

## Policy and control

### 7. Policy of the academic discipline (educational content)

When studying the credit module "Occupational Safety and Civil Protection," it is recommended to use active and collective learning strategies, which are determined by the following methods and technologies:

1) problem-based learning methods (problem-based presentation, partial-search (heuristic conversation) and research methods);

2) personality-oriented (developmental) technologies based on active forms and methods of learning ("brainstorming," "situation analysis," business, role-playing, and simulation games, discussion, express conference, educational debates, round table, etc.);

3) information and communication technologies that ensure the problem-solving and research-oriented nature of the learning process and stimulate independent work by students (electronic presentations for lectures, use of audio and video support for classes, Development and application of creative tasks based on computer and multimedia tools, supplementing traditional classes with interactive tools based on network communication capabilities.

The main focus of lectures should be on specific issues related to the performance of future bachelors' direct duties and functions during practical activities in their primary position.

The working curriculum for the discipline "Occupational Safety and Civil Protection" should be updated annually, taking into account developments in science, technology, culture, economics, technology, and the social sphere.

The Department of Occupational Safety, Industrial and Civil Security, in conjunction with the departments of RTF

of Igor Sikorsky KPI, provides students studying under individual programs with the opportunity to complete educational tasks in "Occupational Safety and Civil Protection" under an individual program, including blended learning technology.

Assessment of the quality of mastery of the curriculum in the discipline "Occupational Safety and Civil Protection" includes ongoing monitoring of student performance and passing exams, and is carried out in accordance with the current Regulations on RSO, which establishes the specifics of the rating, taking into account the content specifics and distribution of teaching time by type of class. The RSO is approved at a meeting of the Department of Occupational Safety, Industrial and Civil Security and is attached to the working curriculum.

*The system of requirements that the teacher sets for the student:*

- comply with the current rules for attending classes (both lectures and practical/laboratory classes);
- comply with the current rules for the protection of laboratory work;
- \*The rules for awarding incentive and penalty points are given in the following section.

## **8. Types of control and rating system for assessing learning outcomes (RSO)**

The semester test in KM is conducted after the completion of the course, before the start of the exam session. The test is accepted by the academic staff member who gave lectures during the last practical class in the study group.

The test is usually graded based on the student's performance during the semester, provided that they have received at least 60 points on the RSE. If the student has not passed the RSE, the test is graded based on the results of their test (if they meet the conditions for admission to the semester test) or the results of the final interview. The maximum number of points a student can receive for a test or interview cannot exceed 30.

The student's rating for the credit module consists of points that they receive for:

- 1) completion of practical work  $R_n$ ;
- 2) completion of laboratory work  $R_{lab}$ ;
- 3) answers to 2 quick polls during lectures (or practical classes)  $R_o$ .

*Current rating point system*

Completion of practical work.

Weight score  $R_{\Pi} = r_n * m$

where:

$r_n$  - number of points for one practical class;  $m$  - number of practical classes.

Points for each practical session  $r_i$  are determined based on the results of individual assignments and written tests.

Assessment criteria:

- *completion of an individual assignment:*

2.5 points – test assignments and calculations are completed flawlessly, all questions are fully addressed and explained, clear and correct conclusions are made;

2 points – all tasks are generally completed (75-89%), with minor flaws that did not affect the final result; arithmetic errors are possible in the calculations;

1.5 points – tasks are generally completed at 60-74%, but some are not fully completed, there may be significant errors or inaccuracies in the calculations, conclusions are not clear and comprehensive;

0 points – tasks are not completed or completed with significant flaws and fundamental errors, the student does not have the knowledge necessary to solve practical problems, conclusions are not made or are incorrect.

- *Completion of written test:*

2.5 points – answers to questions are complete, comprehensive, and well-reasoned; the student is well versed in theoretical and practical material;

2 points – answers to questions are correct, but with some inaccuracies or not entirely complete; 1.5 points – incomplete or inaccurate answers to questions, the student has fragmentary information

0 points – answers to the main questions do not reveal their essence, the student does not have a good grasp of the material.

Thus, the maximum number of points for one practical class is 5.

The maximum value of  $R_n = 5 * 14 = 70$

Completion of laboratory work.

Weighted score –  $R_{lab} = r_{lab} * p_{lab}$

where:

$r_{lab}$  – number of points for one laboratory work;  $p_{lab}$  – number of laboratory works.

Points for each laboratory assignment  $r_{lab}$  are determined based on the results of individual laboratory assignments and written tests.

Assessment criteria:

- *completion of an individual assignment:*

2.5 points – the laboratory work is completed in full and within the allotted time, during the defense of the completed work, the student correctly and fully answers all theoretical and practical questions (at least 90% of the required information), all questions are worked out and disclosed in full, clear and correct conclusions are made;

2 points – laboratory work completed in full and within the allotted time, all tasks generally addressed (75-89%), with minor shortcomings that did not affect the final result, possible arithmetic errors in calculations;

1.5 points – laboratory work completed in full and within the allotted time, tasks completed by 60-74% overall, but some not in full, calculations may contain significant errors or inaccuracies, conclusions are not clear and comprehensive;

0 points – laboratory work has not been completed or has been completed only partially, tasks have not been completed or have been completed with significant shortcomings and fundamental errors, the student does not have the knowledge necessary to solve practical problems, conclusions have not been made or are incorrect.

- *Completion of written test work:*

2.5 points – answers to questions are complete, comprehensive, and well-reasoned; the student is well versed in theoretical and practical material;

2 points – answers to questions are correct, but with some inaccuracies or not entirely complete; 1.5 points – incomplete or inaccurate answers to questions, the student has fragmentary information

0 points – answers to the main questions do not reveal their essence, the student does not have a good grasp of the material.

Thus, the maximum number of points for one laboratory work is 5. The maximum value of  $R_{lab} = 5 * 4 = 20$ .

Quick polls during lectures (or during practical work).

Weighted score  $R_o = r_o * n_o$

where:

$r_o$  – number of points for one survey;  $n_o$  – number of surveys.

Each survey consists of a test with 5 questions. The express test assessment system works as follows:

- the number of points received for correct answers to 3 or more questions is equal to the number of correct answers;

- if the number of correct answers is less than 3, no points are awarded. Thus, the maximum number of points for one survey is 5. The maximum value of  $R_o = 5 * 2 = 10$ .

Based on the results of the first 7 weeks of study, a student can earn 30 points. At the first assessment (8th week), a student receives a "pass" if their current rating is at least 15 points.

Based on the results of 13 weeks of study, the "ideal student" should earn 60 points. At the second assessment (14th week), the student receives a "pass" if their current rating is at least 30 points.

#### **Conditions for admission of students to the exam:**

- no outstanding debts for practical classes and laboratory work;
- the sum of current rating points from the credit module must be at least 40 points.

*\*Notes: At the discretion of the instructor, students who have received a total of current rating points < 40 points may increase it to 40 points by completing additional individual assignments (1 assignment – 5 points).*

If a student has not received a credit for the RSO, a credit may be obtained based on the results of a credit interview. A prerequisite for admission to the credit interview is a starting rating of at least 40 points.

During the interview, students are usually given three questions or tasks. The list of questions/tasks is provided in the appendix to the credit module work program. Each question/task is worth 10 points.

Answer grading system:

- "excellent", complete answer (at least 90% of the required information) – 9-10 points;
- "good," sufficiently complete answer (at least 75% of the required information, or minor inaccuracies) – 7-8 points;
- "Satisfactory," incomplete answer (at least 60% of the required information) – 6 points;
- "unsatisfactory," unsatisfactory answer (containing less than 60% of the required information) – 0 points

Students who have earned a total credit module (**RD**) rating of 60 points or more during the semester have the opportunity to:

- receive an automatic credit, as well as a credit grade in accordance with the rating obtained;

– take a credit test to improve their grade – the test is taken according to the RSO-1 options (the student's previous rating is canceled, and points are awarded based on the results of the test).

The RSO provides for the possibility of additional use of incentive points. Incentive points can be awarded for:

- creative work on the credit module (work in scientific circles with the preparation of materials for reports or articles for publication, participation in scientific and scientific-practical conferences and seminars, academic competitions, contests of works, abstracts and reviews of scientific works, analysis of the current regulatory and legal framework for occupational safety in the country and its compliance with international standards, etc.) students are awarded an additional 3-10 rating points depending on the specific results obtained. Provided they are well prepared and actively participate in practical classes, one or two of the best students in each practical class may be awarded 1 point as an incentive.

The total number of incentive points awarded to a student shall not exceed 10.

The actual number of points received by the student ( $R = R_n + R_{\text{наб}} + R_o$ ), taking into account incentive points, is converted into a grade according to the following table:

Table of correspondence between rating points and grades on the university scale:

<i>Number of points</i>	<i>Grade</i>
100-95	Excellent
94	Very good
84	Good
74-65	Satisfactory
64-60	Sufficient
Less than 60	Unsatisfactory
Admission requirements not met	Not admitted

## 9. Additional information on the discipline (educational content)

The list of tasks included in the semester assessment is provided in Appendix 1 to the syllabus.

### Work program for the academic discipline (syllabus):

Compiled by Associate Professor of the Department of OPPCB, Ph.D., Associate

Professor S.F. Kashtanov. Approved by the Department of OPPCB (Minutes No.

9 dated May 22, 2025).

Approved by the Methodological Commission of the RTF (Minutes No. 06/2025 dated June 26, 2025).