National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Ecology and technology of plant polymers

Certification and control of environmental protection

Work program of the discipline (Syllabus)

Details of the discipline	
Level of higher education	**second (master's)**
Field of knowledge	*10 Natural Sciences*
Speciality	*101 Ecology*
Educational program	*Environmental safety*
Discipline status	*Custom*
Form of study	*full-time (day)/remote/mixed*
Year of preparation, semester	*1st year, spring semester*
Scope of discipline	*5 credits (150 hours)*
Semester control/ control measures	*Exam/modular test paper/ home control work*
Schedule of classes	*4 hours a week (3 hoursand lectures and 1 hour of practical classes)*
Language of instruction	*Ukrainian*
Information about thecourse / teachers	***Лектор:*** *https://eco-paper.kpi.ua/pro-kafedru/vykladachi/nosachova-yuliya-viktorivna.html* ***Практика****: https://eco-paper.kpi.ua/pro-kafedru/vykladachi/nosachova-yuliya-viktorivna.html* ***Лектор****: https://eco-paper.kpi.ua/pro-kafedru/vykladachi/shablij-tetyana-oleksandrivna.html*
Course placement	*https://do.ipo.kpi.ua/course/view.php?id=6069*

The program of the discipline

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

The subject of the discipline is the implementation of measures to improve the conditions and quality of human life, control and inspection of production activities, which will encourage entrepreneurs to develop and implement environmentally friendly technologies in order not only to increase competitiveness, but also to alleviate the negative environmental consequences.

The purpose of studying this discipline is to form in students a set of knowledge, skills, abilities necessary to control and assess the degree of environmental safety of economic activity and the environmental situation prevailing at the facilities (territories); prevention and termination of the negative impact of a certain type of anthropogenic activity on human health and the environment; identification of priorities for solving environmental problems and preparation of substantiated ecological and economic recommendations on the strategy and tactics for solving environmental problems.

In accordance with the goal, the training of masters and specialists requires the strengthening of students' competencies:

- *the ability to organize works related to the assessment of the ecological state, environmental protection and optimization of nature use (FC 14).*

According to the requirements of the educational-professional and educational-scientific program, students after mastering the discipline must demonstrate the following learning outcomes:

- demonstrate awareness of the latest principles and methods of environmental protection (PRN 10);

- to know modern approaches to the organization of ecologically clean productions, reorganization and reconstruction of existing productions from the standpoint of resource conservation (PRN 12).

2. *Prerequisites and post-requisitions of disciplines (place in the structural and logical scheme of education according to the relevant educational program)*

The discipline "Certification and control of environmental protection" is preceded by academic disciplines studied in the bachelor's degree. Academic discipline "Certification and control of environmental protection" provides the defense of the master's thesis.

3. *Content of educational material*

Part I

Section 1. Regulatory framework of expertise on compliance with environmental protection legislation.

Topic 1. General characteristics of the State bodies for monitoring compliance with environmental legislation in production

Topic 2. Conducting inspections on environmental protection

Topic 3. Identification of violations and application of measures of influence to violators of environmental legislation

Topic 4. Cases of detection of facts of violation of environmental legislation. Registration (fixation) of the fact of violation.

Topic 5. Seizure of tools for illegal extraction (procurement) of natural resources, natural resources themselves and products produced from them

Section 2. Types and methods of inspections of production for environmental protection.

Topic 6. Inventory of emissions of pollutants in the enterprise and report on it

Topic 7. Ecological control over the state of atmospheric air

Topic 8. Environmental control over the state of water resources and water use in production

Topic 9. Environmental control over the impact of livestock farms on water bodies

Topic 10. Implementation of state control over the transportation, storage and use of pesticides and mineral fertilizers

Topic 11. Organization of border environmental control.

PartI

Section 1. Interrelationship of metrology, standardization and certification.

Topic 1. General principles of metrology and standardization.

Topic 2. General principles of certification.

Section 2. Metrology

Topic 3. Metrology in the ecological sphere. Physical quantities. Basics of metrology..

Topic 4. Standards.

Topic 5. The concept of the environment and parameters that characterize it.

Section 3. Standardization.

Topic 6. Theoretical and legal bases of standardization.

Topic 7. Organization of work on standardization and requirements for the content of normative documents .

Topic 8. International activity in the field of environmental standardization.

Topic 9. Environmental standardization

Section 4. Certification.

Topic 10. Certification as a means of ensuring the quality of life

Topic 11. Types, bodies and functions of the certification system. Rules and procedure for

certification

Topic 12. Accreditation of conformity assessment bodies

Topic 13. National certification systems in economically developed countries.

Topic 14. Certification of entities, objects and systems. International cooperation

4. Learning materials and resources

Basic

1. Клименко М.О., Прищепа А.М., Стетюк Л.М., Брежицька О.А. Екологічне інспектування. Херсон: Олді+, 2020. 400 с.

2. Екологічне інспектування. Навчальний посібник з практичних (семінарських) занять [Електронний ресурс]: навч. посіб. для студ. спеціальностей 101 «Екологія» ОП «Екологічна безпека», 161 «Хімічні технології та інженерія» ОП «Промислова екологія та ресурсоефективні чисті технології» / КПІ ім. Ігоря Сікорського; уклад.: Ю. В. Носачова, Т. О. Шаблій. – Електронні текстові данні (1 файл: 2,40 Мбайт). – Київ: КПІ ім. Ігоря Сікорського, 2020. – 230 с.

3. Метрологія, стандартизація, сертифікація та акредитація : навчальний посібник / Мирослава Петровська. – Львів : ЛНУ імені Івана Франка, 2020. – 408 с.

4. Стандартизація, метрологія, сертифікація та управління якістю: Підручник / Л.В. Баль-Прилипко, Н.М. Слободянюк, Г.Є.,Поліщук, М.З. Паска, В.Г Бурак. - К.: ЦП «Компринт» - 2017. - 573 с.

5. Салавеліс А.Д., Павловський С.М. Стандартизація, метрологія та сертифікація : Підручник . - К. Олді+, 2023. – 212 с.

Secondary

1д. Положення про Державну екологічну інспекцію. – Затверджено постановою КМУ в редакції від 16 червня 2004 р., №770.

2д. Положення про Державну екологічну інспекцію в областях, містах Києві та Севастополі. – Затверджено наказом Мінприроди від 19 грудня 2006 р., №548.

3д. Положення про Державну екологічну інспекцію Азовського моря. – Затверджено наказом Мінприроди від 23 лютого 2004 р., № 64.

4д. Порядок організації та проведення перевірок суб'єктів господарювання щодо дотримання вимог природоохоронного законодавства. – Затверджено наказом Мінприроди від 10 вересня 2008 р., №464.

5д. Методичні рекомендації «Про порядок проведення інспекторських перевірок по дотриманню природокористувачами вимог законодавства по охороні навколишнього природного середовища». – Затверджено наказом Головної екологічної інспекції Мінприроди від 28 березня 1994 р., №7.

6д. Порядок обмеження, тимчасової заборони (зупинення) чи припинення діяльності підприємств, установ, організацій і об'єктів у разі порушення законодавства про охорону навколишнього природного середовища. – Затверджено постановою ВРУ від 29 жовтня 1992 р., №2751 – XII.

7д. Перелік видів діяльності, що належать до природоохоронних заходів. – Затверджено постановою КМУ в редакції від 17 грудня 2004 р., №1700.

8д. Закон України «Про охорону атмосферного повітря». – Збірник законодавчих актів: Законодавство України про охорону навколишнього середовища. – Київ, Парламентське видавництво. – 2006, с. 79-95.

9д. Закон України «Про охорону земель». – Збірник законодавчих актів: Законодавство України про охорону навколишнього природного середовища. – Київ, Парламентське видавництво. – 2006, с. 96-119.

10д. Закон України «Про державний контроль за використанням та охороною земель». – Збірник законодавчих актів: Законодавство України про охорону навколишнього природного середовища. – Київ, Парламентське видавництво. 2006, с. 120-129.

11д. Положення «Про встановлення рівнів шкідливого впливу фізичних і біологічних факторів на атмосферне повітря». – Затверджено постановою КМУ від 31 грудня 1993 р., №1092.

12д. Інструкція «Про зміст та порядок складання звіту проведення інвентаризації викидів забруднюючих речовин на підприємстві». – Затверджено наказом Мінприроди від 10 лютого 1995 р., №7.

13д. Інструкція «Вимоги до розміщення та обладнання місць відбору проб з газопилових потоків». – Там же. – с. 214-216.

14д. Положення «Про проведення операції «Чисте повітря». – Там. Же. – с. 176-188.

15д. Інструкція «Про відбір проб води». – Там же. – с. 217-220.

16д. Порядок планування та проведення перевірок з питань здійснення державного контролю за використанням та охороною земель. – Затверджено наказом Держкомітету по земельних ресурсах від 12 грудня 2003 р., №312.

17д. Інструкція з оформлення державними інспекторами з контролю за використанням і охороною земель Держземінспекції та її територіальних органів матеріалів про адміністративні правопорушення. – Затверджено наказом Держкомітету по земельних ресурсах від 28 квітня 2009 р., №205.

18д. Порядок встановлення нормативів збору за забруднення навколишнього природного середовища і стягнення цього збору. – Затверджено постановою КМУ від 1 березня 1999 р., №303.

19д. Інструкція про порядок обчислення та сплати збору за забруднення навколишнього природного середовища. – Затверджено наказом Мінприроди та Державної податкової адміністрації від 19 липня 1999 р., №544/3837.

20д. Методика розрахунку розмірів відшкодування збитків, заподіяних державі внаслідок порушення законодавства про охорону та раціональне використання водних ресурсів. – Затверджено наказом Мінприроди від 20 липня 2009 р., №389.

21д. Законодавство України про охорону навколишнього природного середовища. Збірник законодавчих актів. – Київ, Парламентське видавництво, 2006. – 200с.

22д. Правила технічної експлуатації установок очистки газу, затверджені наказом Міністерства охорони навколишнього природного середовища України від 06 лютого 2009 року № 52, зареєстрованим в Мін`юсті України 13 квітня 2009 року за № 327/16343

23д. Методика визначення розміру шкоди завданої землі, ґрунтам внаслідок надзвичайних ситуацій та/або збройної агресії та бойових дій під час дії воєнного стану. Наказ Міністерства захисту довкілля та природних ресурсів України 04 квітня 2022 року № 167.

24д. Топольник, В. Г. Метрологія, стандартизація, сертифікація і управління якістю: навч. посіб. / В. Г. Топольник, М. А. Котляр . – Львів : вид-во Магнолія 2006, 2015 . – 216 с.

25д. Метрологія та стандартизація : навч. посіб. для студентів вищ. навч. закл. / Р. М. Тріщ, Д. А. Янушкевич, М. В. Москаленко, О. Є. Малецька. – Харків : [б. в.], 2014. – 444 с.

26д. Офіленко, Н. О. Маркування товарів в Україні та за кордоном [Текст] : навчально-методичний посібник / Н. О. Офіленко. – Полтава : ПУЕТ, 2019.

27д. Метрологія, стандартизація, сертифікація в будівництві: питання та відповіді: навчальний посібник [Електронний ресурс] / В. Р. Сердюк. – Вінниця: ВНТУ, 2018, (PDF, 162 с.)

28д. Поліщук Є. С., Дорожовець М. М., Яцук В. О. Метрологія та вимірювальна техніка. – Львів, 2012. – 544 с.

Інформаційні ресурси в Інтернеті

1. Ministry of Environmental Protection and Natural Resources of Ukraine - https://mepr.gov.ua/

2. *ISO 9000 Standards Series https://asq.org/quality-resources/iso-9000*
3. *ISO 14000 Standards Series https://asq.org/quality-resources/iso-14000*
4. *State Statistics Service of Ukraine - http://www.ukrstat .gov.ua*
5. *Ecological portal of Ukraine – http://www.ecolog.org.ua/*
6. *Vernadsky Library – www.nbuv.gov.ua*
7. *Electronic archive of scientific and educational materials of KPI named after Igor Sikorsky - ELAKPI URL: https://ela.kpi.ua*

Educational content

5. Methods of mastering the discipline (educational component)

Lectures

Lectures are aimed at:

- providing modern, holistic, interdependent knowledge of the discipline "Certification and control of environmental protection", the level of which is determined by the target setting for each specific topic;

- ensuring in the process of the lecture the creative work of students together with the teacher;

- education of students' professional and business qualities and the development of their independent creative thinking;

- formation of students' necessary interest and providing direction for independent work;

- determination at the modern level of development of science and technology in the field of environmental protection, forecasting their development for the coming years;

- reflection of the methodological processing of the material (selection of the main provisions, conclusions, recommendations, clear and adequate to their formulations);

- use for demonstration of visual materials, combination, if possible, them with a demonstration of results and samples;

- teaching research materials in a clear and high-quality language in compliance with structural and logical connections, explaining all newly introduced terms and concepts;

- accessibility for perception by this audience.

N	The title of the lecture topic and the list of main issues (list of didactic tools, references to literature and tasks for the ISW)	Number of hours
	Part I	
1	***General characteristics of the State bodies for monitoring compliance with environmental legislation in production*** *General information about state environmental control bodies. Powers and rights of the State (Main) Environmental Inspectorate (State Environmental Inspection). Powers of the State Environmental Inspectorate. Rights of the State Environmental Inspectorate. Powers and rights of the State Environmental Inspectorates in the regions, the city of Kyiv (hereinafter – the Inspections). Powers of Inspections. Rights Inspections. Inspection management.* ***Literature:[****1д] pp. 10-12, 1д pp. 8-10.* *The task at the ISW is to consider the competence of state bodies of local self-government in the field of environmental protection.*	2
2	***Conducting inspections on environmental protection*** *Forms of notification of the scheduled inspection and referral to the inspection. Start verification. The course of the check. Registration of the check. Forms of verification documents (Act of verification of compliance with the requirements of environmental legislation, Order, Submission for issuance, suspension or cancellation of a permit, limit, quota).* ***Literature:*** *[1] pp. 62-88; [4d]*	2

	The task for the ISW is the powers possessed by public inspectors for the protection of the NPS. To consider the forms of statistical reporting of economic objects for the protection of nps[1] pp.46-61	
3	***Identification of violations and application of measures of influence to violators of environmental legislation*** *Cases of detection of facts of violation of environmental legislation. Registration (fixation) of the fact of violation. The procedure for applying measures of influence.* ***Seizure of tools for illegal extraction (procurement) of natural resources, natural resources themselves and products produced from them*** *Seizure of tools for illegal extraction (procurement) of natural resources. Seizure of illegally extracted (harvested) natural resources or products produced from them. Storage of seized tools for illegal extraction (procurement) of natural resources, floating means, weapons and ammunition. Storage of illegally extracted (harvested) natural resources or products made from them. Sale of illegally extracted (harvested) natural resources or products made from them.* ***Literature:** [1]pp. 72-76; 6d, 8d, 26d* *The task of the ISW is to characterize the procedure for the extraction of illegally extracted natural resources or products produced from them [6d]*	*2*
4	***Inventory of emissions of pollutants in the enterprise and report on it*** *What regulates the inventory and reporting? Basic terms and their definitions. The order of the inventory. The content of the report. Annexes to the instruction "On the content and procedure for drawing up a report on the inventory of emissions of pollutants in the enterprise."* ***Literature:** [21d] pp. 75-91, [14d]* *The task of the ISW is to analyze the methods for determining pollutants in the enterprise [21d], pp. 64-65, 96-99, [16d], [18d]*	*2*
5	***Ecological control over the state of atmospheric air*** *Features of inspections of stationary and mobile sources of pollution. The main violations of the legislation on the protection of atmospheric air.* ***Literature:** [1]pp. 264-290; [21d]art. 91-100; [28d].* *The task of the ISW is to characterize the criteria for rationing the quality of the environment in the field of air protection [13 d].*	*2*
6	***Environmental control over the state of water resources and water use in production*** *Conducting an inspection on potential sources of contamination of surface and groundwater and the general sanitary condition of the facility. How water protection checks are carried out Features of checking reclamation systems. The main violations in the field of water legislation.* ***Literature:** [1] pp. 145-171; [21d] pp. 91-100.* *The task of the ISW is to characterize the ownership of water [27d]*	*2*
7	***Environmental control over the impact of livestock farms on water bodies*** *Features of water pollution by livestock complexes. Water supply complexes and water consumption rates. The main schemes of processing manure. General information. Treatment of manure in pig-breeding complexes. Processing manure on cattle complexes. Objects of inspection at livestock farms. Information on the object. The state of water supply. The*	*2*

	state of drainage. Treatment and storage of manure, wastewater disposal. Emergency pollution. Registration of the results of the check. ***Literature:*** *[21d] pp. 102-110, [19d]* *Tasks for the ISW: Processing of manure on cattle complexes – [21d] pp. 107*	
8	***Implementation of state control over the transportation, storage and use of pesticides and mineral fertilizers*** *Definition of the concept of "pesticides", a group of pesticides. Checking the storage of pesticides and mineral fertilizers. Checking the transportation of pesticides and mineral fertilizers. Checking the use of pesticides and mineral fertilizers. The procedure for conducting a comprehensive inventory of places of accumulation of prohibited and unsuitable for use in agriculture chemical plant protection products.* ***Literature:*** *[1] pp. 331-333* *The task of the ISW is to characterize the procedure for conducting a comprehensive inventory of the places of accumulation of unknown, prohibited and unsuitable for use in agriculture chemical plant protection products [14d]*	*2*
9	***Organization of border environmental control****.* *Conceptual foundations of state environmental control at the border. The main tasks of the environmental control service at the border. Goods and shipping documents subject to border environmental control. Border environmental control of dangerous goods and waste. Radiation border control. Levels of control.* ***Literature:*** *[1] pp. 311-361* *The task at the ISW is to characterize the procedure for conducting border environmental control of objects of flora and fauna. [29d]*	*2*
	Part II	
10	***General principles of metrology, standardization and standardization*** *Interrelationship of metrology, standardization and certification. The essence and task of metrology. The essence of standardization. The essence and purpose of the certification activity. Formation and development of metrology, standardization, certification.* ***Literature****: [3, 4, 5]* *Tasks at the IWS: Features of the modern stage of development of metrology, standardization and certification.*	*2*
11	***Metrology in the ecological sphere. Physical quantities. Basics of metrology*** *Physical quantities as the main object of measurement. Basic units of physical quantities. International system of units of measurement of physical quantities. Measurement methods. Measuring tools. Measurement planning. Measurement errors. State system of industrial devices and means of automation. Verification of measuring equipment* ***Literature****: [3, 4, 5]* *Tasks at the IWS: Explain the qualitative and quantitative aspect of a physical quantity. Classification of measuring equipment. Concept of randomization.*	*2*
12	***Standards. The concept of the environment and its parameters*** *Standards of units of physical quantities. The state system of ensuring the unity of measurements. Legislative and formative provision of the unity of measurements. Composition and structure of the environment.*	*2*

	Quantities are quantitative and qualitative characteristics of the environment. Environmental parameters, their classification ***Literature**: [3, 4, 5]* *Tasks at the IWS: Changing the standard of time in the history of mankind. The difference between metric and non-metric scales*	
13	***Theoretical and legal bases of standardization*** *The essence, principles, purpose and tasks of standardization. Types of standardization and standards. Legal basis of standardization. Basic concepts and their definitions* ***Literature**: [3, 4, 5]* *Tasks at the IWS: Concept of a set of standards*	*2*
14	***Organization of work on standardization and requirements for the content of regulatory documents*** *Organization of standardization work. Normative documents and the procedure for their development. Rules for designation of regulatory documents. Content of standards and technical conditions.* ***Literature**: [3, 4, 5]* *Tasks at the IWS: Content of basic organizational and methodical standards.*	*2*
15	***International activity in the field of environmental standardization. Ecological standardization*** *International and European standardization organizations. International and European standards for quality and environmental protection. Development of international standards. Ukraine's participation in international activities in the field of environmental standardization. System of environmental standards. System of environmental protection standards. System of environmental management standards. Environmental labeling.* ***Literature**: [3, 4, 5]* *Tasks at the IWS: Preparatory stage of the international standard. Bar coding*	*2*
16	***Types, bodies and functions of the certification system. Rules and procedure for certification*** *Types of certification. Organizations and certification systems. General scheme, rules and procedure for certification.* ***Literature**: [3, 4, 5]* *Tasks at the IWS: Certification of environmental management systems. Quality management. UkrSEPRO certification system.*	*2*
17	***Accreditation of conformity assessment bodies*** *The role of accreditation in the modern world. International norms applied in the process of accreditation. Accreditation of bodies that accredit conformity assessment bodies (ISO/IEC 17011). Accreditation of control bodies (ISO/IEC 17020). Accreditation of audit bodies and certificates of management systems (ISO/IEC 17021). Accreditation of personnel certification bodies (ISO/IEC 17024). Accreditation of testing and calibration laboratories (ISO/IEC 17025). Accreditation of bodies performing proficiency testing and interlaboratory comparisons (ISO/IEC 17043). Accreditation of product certification bodies (ISO/IEC 17065). International organizations operating in the field of accreditation. International Accreditation Forum (IAF). International Organization for Cooperation in the Field of Accreditation of Laboratories and Control Bodies (ILAC). European Association for Accreditation (EA). Participants of accreditation works in*	*2*

	Ukraine. Th ***Literature**: [3, 4, 5]* *Tasks at the IWS: International practice of organizing activities in the field of certification and accreditation.*	
18	***National certification systems in economically developed countries. International cooperation*** *National certification system of France. National certification system of Germany. US national certification system. Japan's national certification system. Personnel certification. Environmental certification of territories. Quality management systems and environmental management systems: implementation in the world and in Ukraine. International cooperation in the field of technical regulation of society's vital activities. Activities of Ukrainian technical committees. Cooperation at the global level.* ***Literature**: [3, 4, 5]* *Tasks at the IWS: Environmental certification in Western European countries. Ways of certifying the fact of certification.*	*2*
	Total:	*36*

Practical classes

In the system of professional training of students in this discipline, practical classes occupy 33 % of the classroom load. The ability to use special terminology, allow you to test knowledge, so this type of work is an important means of operational feedback. Practical classes should perform not only cognitive and educational functions, but also contribute to the growth of students as creative workers in the field of environmental protection.

The main objectives of the cycle of practical classes:

- help students systematize, consolidate and deepen theoretical knowledge in the field of modern principles of urban ecosystem formation;

- teach students techniques for solving practical problems, promote mastering the skills and abilities of performing calculations, graphic and other tasks;

- teach them to work with scientific and reference literature and regulatory documents;

- to form the ability to learn independently, that is, to master the methods, methods and techniques of self-learning, self-development and self-control.

N	*The name of the topic of the lesson and the list of main questions (list of didactic support, references to literature and tasks for the ISW)*	*Number of hours*
1	***Calculation of the amount of compensation for losses caused to the state as a result of excessive emissions of pollutants into the air*** *- calculations of excess emissions of pollutants into the atmospheric air are given;* *- the procedure for determining excess emissions of pollutants into the atmospheric air is considered;* *- the amount of compensation for losses for excessive emissions of pollutants into the atmospheric air is given.* *Literature: 2, 28∂* *Tasks on the ISW. Rules of technical operation of gas treatment plants. [28d]*	*4*
2	***Calculation of the amount of compensation for losses caused to the state as a result of violation of the legislation on the protection and rational use of water resources*** *Pollution of water bodies by excessive discharges of pollutants into a water body with return water. Calculation of the mass of excess discharge of pollutants into a water body with return water. Calculation of the mass*	*4*

	of oil and petroleum products dumped into a water body due to leakage or outpouring. *Literature: 2, 27* *Tasks on the ISW. Calculation of oil mass based on expert estimates. 2*	
3	***Topic: Calculating the amount of the nps pollution fee*** *Determination of the amount of compensation for losses caused to the state as a result of unauthorized use of subsoil. Calculation of emissions of pollutants into the air from vehicles. Calculation of the fee for environmental pollution.* *Literature: [2] pp. 69 - 74* *Tasks on the ISW. Determination of losses in the absence of a permit for the release of substances into the atmosphere.Conditions for combining a group of emission sources.*	*4*
4	***Determining the amount of damage caused by pollution and clogging of land resources due to violation of environmental legislation*** *Literature: [2] pp. 47-60* *Tasks on the ISW. Determining the amount of damage caused to land resources as a result of hostilities. [29d]*	*4*
5	***Modular control work***	*2*
	Total	*18*

6. Independent work

Independent work takes up 52% of the credit module study time, including exam preparation. The main task of students' independent work is the acquisition of scientific knowledge in areas that are not included in the list of lecture questions through personal search for information, formation of an active interest in a creative approach to educational work. In the process of independent work within the framework of the educational component, the student must learn to deeply analyze modern approaches to the development and implementation of the latest approaches to control compliance with the requirements of environmental legislation in the implementation of industrial activities.

N	*The name of the topic submitted for independent study*	*Number of hours*
Part I		
Section 1. State bodies of environmental control and inspection, inspections		
1	*Get acquainted with the main legislative acts in various fields of environmental protection. To consider the competence of state bodies of local self-government in the field of environmental protection.* *Literature: 1d -6d.* *The powers possessed by public inspectors for the protection of the NPS. To consider the forms of statistical reporting of economic objects for the protection of NPS* *Literature: [1] pp. 46-61,* *Consider what legislative acts are guided by the state inspector in the preparation of the protocol* *Literature: [5d, 6d]*	*10*
Section 2. Verification of enterprises and time standards for inspection		
2	*To characterize the procedure for the seizure of illegally extracted natural resources or products produced from them* *Literature: [6d] pp. 120-122* *To characterize the criteria for rationing the quality of the environment in the field of air protection.* *Literature: [13 d]*	*10*

	Analyze the methods for determining pollutants in the enterprise *Literature: [21d]pp. 64-65, 96-99, [16d], [18d]* *Characterize ownership of water* *Literature: [27d].* *Processing manure on cattle complexes.* *Literature: [21d] pp. 107*	
Section 3. Implementation of state control over the protection of lands, forests and other plant resources		
3	*Analyze legal documents in the field of land resources protection* *Literature: [20d], [23d]* *Characterize forest management in other countries* *Literature: [1] pp. 221* *Indicate the reasons for planning the shooting of wild animals* *Literature: [1] pp. 110-116* *To characterize the procedure for conducting a comprehensive inventory of places of accumulation of unknown, prohibited and unsuitable for use in agriculture chemical plant protection products* *Literature: [14d]*	*10*
Section 4. The procedure for the establishment, calculation and payment of fees for environmental pollution		
4	*Consider at the expense of whom the costs of laboratory research are covered* *Literature: [7d] pp. 76* *Issuance, cancellation or termination of permits, limits and quotas.* *Literature: [24d, 25d, 27d]* *Analysis of regulatory documentation that regulates citizens' access to environmental information* *Literature: [27d]*	*5*
Part II		
Section 1. *Interrelationship of metrology, standardization and certification.*		
1	*Justify the need for a close connection between metrology, standardization and certification. The difference between a standard and a regulatory document. Normative documents valid today on the territory of Ukraine. The main stages of the development of metrology, standardization and certification.*	*10*
Section 2. *Metrology*		
2	*Composition of information on the state of the environment. The role of metrology in ensuring the necessary quality of life. Necessity of metrological studies of environmental parameters. The difference between means and methods of metrology. Applied function of metrology. Legislative function of metrology. Theoretical function of metrology. The value of additional units of the SI system. Formation of derived values (on an example). Concept of physical quantity. Classification of physical quantities according to the nature of manifestation. Classification of physical quantities according to the hierarchical principle. The dimensionality of a physical quantity. SI system of units. Requirements when using multiple and fractional units. Non-systemic units and reasons for their use. Use of different temperature scales. The history of the development of various systems of measurement units. Value of accuracy classes of devices. Convergence method and double convergence method. Disadvantage of the direct assessment method. Single-valued and multi-valued*	*10*

	measures. Basic methods of converting non-electric quantities into electrical quantities. Measuring tools and measuring devices. The concept of measuring instruments and their classification. Concept of measuring devices and their classification. The difference between measuring devices and measuring systems. The main distinguishing feature of measuring units. Composition of the measuring system. Purpose of measuring transducers. Accuracy classes of devices. Basic non-metrological characteristics of measuring instruments. The main stages of the measurement process. Influential quantities. Their normal and working values. Existing type of verification. Stages of preparation and planning of measurements. Errors that distinguish depending on the place of occurrence. System and technical principles of chipboard construction. The concept of the true and valid value of a quantity. The concept of measurement error. Causes of measurement errors. Types of measurement errors. Processing and analysis of measurement results. Concept of passive and active experiment. Systematic errors. Random errors and their elimination. Gross errors and work with them. Classification of standards according to various features. Transferring the size of units of physical quantities. The history of the development of the meter standard. The initial and modern standard of the kilogram. Features of the time standard. The main purpose of standards and the main requirements for them. Concept of group and single standards. Limitation of the accuracy of the standard. Accuracy of reproduction of the platinum-iridium prototype meter. The principle of creating Johanson tiles and KMD set No. 1. The essence of the "electronic kilogram". Ephemeris time. The concept of unity of measurements. Tasks of the state system of ensuring the unity of measurement. Classifications of physical quantities. The main types of scales. Environment parameters. Concept of scales and their purpose. Related concepts "environment" and "environment". Classification of quantities - parameters of the environment.	
	Section 3.** Standardization**.	
3	*Standardization as an attribute of statehood. Concept of standardization. The purpose and main tasks of standardization. Basic principles of standardization. Levels of standardization. Concept of standard. The main objects of standardization. Subjects of standardization. The central body in the field of standardization in Ukraine. Functions of the central body in the field of standardization. Concept of organization standard. Normative base of the state standardization system. Content of standards for products and services. State supervision of compliance with standards. Designation of national standards. The concept of instructions, a set of rules. Code of established practice. Concept of technical conditions. Technical conditions, their difference from the standard. Designation of technical conditions. Content of standards on TU. Content of standards for control methods. Concept of technical regulations. The concept of a classifier. State classifiers. Indexes of documents. Content of fundamental general technical standards. International Electrotechnical Commission. The main areas of activity of the International Electrotechnical Commission. European standards and their series. The stage of approval in the preparation of the international standard. The first national standardization organizations. Organizations for standardization in*	*15*

	Europe. The preliminary stage of preparation of the international standard. The main tasks of ISO. The proposal stage in the preparation of an international standard. International standards ISO 9000 series. Preparatory stage of the international standard. Organizational structure of ISO. International standards of the ISO 14000 series. The stage of discussion during the preparation of the international standard. Specify the main groups that include the system of environmental standards according to DK 004. Signs used to indicate the environmental friendliness of objects or their individual properties. Marking regarding safety and energy efficiency rules. Tare marking by type of material. Environmental labeling in Ukraine. Bar code structure. System of environmental management standards. System of environmental protection standards. Main types and levels of national environmental protection standards. Ecological labeling sign "Environmentally clean and safe". ISO standards for environmental management. Cuctema cmandapms with axucmy dovkiuuya. System of ecological standards. System of environmental management standards. A system of standards for the quality of objects of the natural environment. Cucmena cmandapmiv with infinite nidnpuzhencmv has infinite npaci. Standardization of professional safety and industrial hygiene. Standardization of employee safety and protection against noise and accidental damage. Safety and protection against electro-magnetic shock. Cucmena cmandapmiv in the field of palliative care. Standardization of patient safety and protection against radiation damage. Safety and protection against ionizing radiation. Personal safety and protection against microwave, ultraviolet and laser interference.	
	Section 3. *Certification*	
	Purpose of certification, its object and subject. The difference between license, certificate and mark of conformity. Define the terms "eligibility", "eligibility certificate", "eligibility certificate", "eligibility certificate". requirements for production attestation. International certification organization. Subjects of certification in Ukraine. Types of certification. Types of certification and their features. Subjects of certification abroad. Terms and definitions in the field of conformity assessment. Normative documents of Ukraine in the field of certification. Personnel certification. Environmental certification of territories. Quality management systems and environmental management systems: implementation in the world and in Ukraine. Activities of Ukrainian technical committees. Cooperation at the global level. Regional cooperation. General information, rules and procedures for certification. Trends in the development of Ukraine's activities in the field of certification. Symbols and language mapping. The sign of conformity and the rules of its establishment. Map of goods. International signs correspond to the event. Ecological packaging and ecological labeling. Purpose, purpose and objects of ecological certification. Ecological certification in Western European countries. Ecological marking. The main functions of certification bodies (national certification body – State Standard of Ukraine, scientific and technical commission, product certification bodies, quality system certification bodies, testing laboratories, staff of auditors, scientific-methodical and information center, territorial centers of standardization, metrology	*15*

	and certification , Ukrainian educational and scientific center for standardization, metrology and product quality). Basic requirements for product certification bodies. Requirements for certification body documentation. Procedure for accreditation of bodies and services and inspectors. The procedure for certifying auditors and the procedure for canceling a certificate.	
4	*Preparation for MCT*	*6*
5	*Exam preparation*	*30*
	Execution of HCW	*10*
	Total	*96*

Individual tasks

According to the curriculum, the student must perform an individual task in the form of home control work (HCW).

Independent work performs several educational functions at the same time. Firstly, the HCW covers in a more specific form those issues that the teacher considered briefly; secondly, the student receives skills in working with modern scientific literature and the ability to analyze a certain problem; Thirdly, presenting his scientific work in class in front of his colleagues, the author of the HCW learns to make scientific reports and defend his point of view in a discussion in which the students themselves take part.

In addition, it is recommended to use monographs, special articles, textbooks for university students and periodicals as auxiliary literature.

Control works

The purpose of the tests is to consolidate and verify theoretical knowledge from the credit module, students to acquire practical skills of independent problem solving. There are 2 MCT. Each student receives an individual assignment to which written answers must be provided and sent.

Provision of program results by components of the educational component

Name PR	***Lecture classes***	***Practical lessons, individual task***
to master the basics of ecological engineering design and expert environmental impact assessment;	*Lecture 1,2-I. General characteristics of State control bodies over compliance with environmental protection legislation at factories* *Lecture 3,4,5-I. Detection of violations and application of measures of influence to violators of environmental legislation* *Lecture 1-II. 3 general principles of metrology, standardization and standardization* *Lecture 2-II. Metrology in the ecological sphere. Physical quantities. Basics of metrology* *Lecture 3-II. Standards. The concept of the environment and its parameters*	*Practical lessons 1 - 4*
to know up-to-date approaches to the organization of environmentally cleaner production, reorganization and reconstruction of	*Lecture 6,7-I. Inventory of emissions of polluting substances at the enterprise and report on it* *Lecture 7,8,9-I. Ecological monitoring of atmospheric air* *Lecture 6-I. Environmental monitoring of the state of water resources and water use in production*	*Practical lessons 1 - 4*

existing production from the standpoint of resource conservation, taking into account the life cycle of the product.	*Lecture 4-II. Theoretical and legal bases of standardization.* *Lecture 5-II. Organization of work on standardization and requirements for the content of regulatory documents* *Lecture 6-II. International activity in the field of environmental standardization. Ecological standardization* *Lecture 7-II. Types, bodies and functions of the certification system. Rules and procedure for certification* *Lecture 8-II. Accreditation of conformity assessment bodie* *Lecture 9-II. National certification systems in economically developed countries. International cooperation*	

Policy and control

7. Policy of the discipline (educational component)

Rules for attending classes and behavior in the classroom

Students are obliged to take an active part in the educational process, not to be late for classes and not to miss them without a good reason, not to interfere with the teacher to conduct classes, not to be distracted by actions that are not related to the educational process.

Rules for assigning incentive and penalty points

Rules for assigning incentive and penalty points.

- incentive points can be awarded by the teacher solely for the performance of creative work in the discipline or additional completion of online specialized courses with the receipt of the appropriate certificate:

- https://www.coursera.org/learn/environmental-law.

- https://www.coursera.org/learn/russian-water-management?isNewUser=true

But their amount cannot exceed 10 % of the rating scale.

-penalty points in the framework of the discipline are not provided.

Deadlines and Rescheduling Policy

In case of debts in the discipline or any force majeure circumstances, students should contact the teacher through the available (provided by the teacher) communication channels to solve problematic issues and agree on an algorithm of actions for working out.

Academic Integrity Policy

Plagiarism and other forms of dishonest work are unacceptable. Plagiarism includes the lack of links when using printed and electronic materials, quotes, opinions of other authors. Unacceptable hints and write-offs when writing tests, conducting classes; passing the test for another graduate student; copying materials protected by the copyright system without the permission of the author of the work.

The policy and principles of academic integrity are defined in Chapter 3 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". Read more: https://kpi.ua/code

Academic Conduct and Ethics Policy

Students should be tolerant, respect the opinions of others, formulate objections in the correct form, constructively maintain feedback in the classroom.

The norms of ethical behavior of students and employees are defined in Chapter 2 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". Read more: https://kpi.ua/code

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

Distribution of study time by types of classes and tasks in the discipline in accordance with the working curriculum:

Semester	Study time		Distribution of study hours				Control measures		
	Loans	acad. H.	Lecture	Practical	Lab. Rob.	ISW	MCT	HCW	Semester control
2	5	150	36	18	–	96	1	1	Exam

The student's rating on the discipline consists of points that he receives for:

*According to the full-time form of education, it is proposed to introduce a rating system for assessing the success of students mastering educational material from the credit module. The student's rating from the credit module "**Certification and control of environmental protection**" consists of points received for:*

1) *Express control at lectures;*
2) *work in practical classes;*
3) *two tests;*
4) *execution of HCW*
5) *answers to the exam.*

Semester control is an exam.

The system of rating (weight) points and evaluation criteria

Rating points system and evaluation criteria:

1. *Express control at lectures:*

Weight score –3.

6 responses 3×6=18 points

Criteria for assessing students' knowledge:

Completeness and signs of response	***Points***
Clear and complete answer to the question	*3*
The answer made some inaccuracies or errors	*1 - 2*
Answer not credited	*0*

2. *Work in practical classes:*

*Weight point – 1 point. The total number of points in practical classes is 1 * 4 = 4 points.*

Criteria for evaluating students' knowledge:

Completeness and signs of response	***Points***
Performing a practical task	*1*
Failure to perform practical work	*0*

3. *Modular control* ***(R_m)***

Weight point – 10 points. The maximum number of points for all tests is 10 points2= 20 points.×

Criteria for evaluating tests:

Completeness and signs of response	***Points***
Clear and complete answer to the question	*10*
The answer made some inaccuracies or errors	*5... 8*
The answer does not contain the wording of terms, laws and formulas	*4... 1*
Answer not credited	*0*

4. *Subject to the implementation of the HCW.*

Weight point – 18 points.

Criteria for evaluation of HCW:

Mark	Completeness of the answer
15 - 18	"excellent» creative approach to solving the problem, reflected own position
8 - 14	"good", reasonable disclosure of the problem with certain shortcomings
1 - 7	"satisfactory", the topic is disclosed incompletely
0	"unsatisfactory", the topic is not disclosed, the DKR is not counted

Calculation of the scale (R) of the rating:

The sum of the weight points of the control measures during the semester is:

$$R_c = 3 * 6 + 1 * 4 + 10 * 2 + 18 = 60 \text{ балів.}$$

According to the results of educational work in the first 7 weeks, the "ideal student" should score 30 points. At the first certification (8th week), a student receives "enrolled" if his current rating is at least 20 points.

According to the results of educational work for 13 weeks of study, the "ideal student" should score 60 points. At the second certification (14th week), a student receives "enrolled" if his current rating is at least 40 points.

During the exam, students give answers to 4 questions, each of which is estimated at 10 points.

The maximum number of points is 4x10=40 points.

The component of the examination scale is 40% of R:

$$R_{ex} = 40 \text{ points.}$$

Thus, the rating assessment in the discipline is:

$$R = 60+40 = 100 \text{ points.}$$

Students who have received an F grade are not allowed to take the exam and must increase their rating.

A prerequisite for admission to the exam is the fulfillment of all ICRs.

Criteria for assessing students' knowledge at the exam:

Completeness and signs of response	***Points***
Full answer to all questions	*10*
The answer made some inaccuracies	*8... 9*
This partial answer or in answers to questions and mistakes made	*6... 7*
This fuzzy answer: missing or made mistakes in formulas, reactions, terms and definitions	*4... 5*
Unsatisfactory answers to individual questions and the presence of significant errors on other questions are given	*1... 3*
Answer not credited	*0*

Rating score from the exam:

Балл $R=R_C+R_{EK3}$	*University scale*
95... 100 points	*Perfectly*
85... 94 points	*Very good*
75...84 points	*Well*
65... 74 points	*Satisfactory*
60...64 points	*Enough*
R<60 points	*Disappointing*
If r_c<40 points or other conditions for admission to the exam are not met	*Not allowed*

9. Additional information on the discipline (educational component)

Approximate list of HCW tasks

1. Formation of derived quantities (on an example) 2. Extrasystem units and reasons for their use 3. Ephemeris time 4. Adaptation of domestic legislation in the field of norms and standards to European requirements 5. Levels of product unification. Coefficients for determining product uniformity 6. Structure of legislation and regulatory documents in the field of standardization 7. Procedures for the development and adoption of standards 8. Procedure for development and approval of technical conditions 9. Procedure for development and approval of technical regulations 10. The procedure for certification of auditors and the procedure for canceling a certificate. 11. International social responsibility standards: SA 8000 social responsibility standard, ISO 26000 "Guidelines for social responsibility", OHSAS occupational safety management standards 12. Identification numbers of the coding system 13. Environmental certification of territories 14. Quality management systems and environmental management systems: implementation in the world and in Ukraine 15. Trends in the development of Ukraine's activities in the field of certification 16. Requirements for product certification bodies. Their representatives in Ukraine 17. Requirements to bodies for certification of environmental management systems. Their representatives in Ukraine 18. Overview of the process of certification of environmental management systems in Ukraine over the last ten years 19. Results/consequences/experience of implementing environmental management systems (on specific examples) 20. Procedure for maintaining and renewing certified environmental management systems/product quality systems

The work program of the discipline (syllabus):

Compiled *by Prof., Doctor of Technical Sciences, Radovenchik V.M., Assoc.Prof., Ph.D., Nosachova Yu.V.*

Approved *by the* ***Ecology and technology of plant polymers*** *(protocol No 17 from 23.05.2024)*
Approved *by the CEF Methodical Commission (protocol No.10 of 28.05.2024)*