



Environmental Management

Working program of basic discipline (Syllabus)

Requisites for basic discipline

Level of higher education	<i>First (bachelor's)</i>
Branch of knowledge	<i>16 Chemical and Bioengineering</i>
Specialty	<i>163 Biomedical Engineering</i>
Educational program	<i>Medical Engineering</i>
Discipline status	<i>Mandatory discipline</i>
Form of study	<i>full-time</i>
Year of preparation, semester	<i>2nd year, spring semester</i>
The scope of discipline	<i>2 ECTS credits</i>
Semester control / Control measures	<i>Test, Modular Control Work</i>
Lessons schedule	<i>According to the schedule on the site http://rozklad.kpi.ua/</i>
Language of instruction	<i>English</i>
Information about course leader / teachers	Lecturer/ Practical: Alina Dychko, Dr.Sci., Prof. <i>e-mail: aodi@ukr.net, Telegram: https://t.me/AlinaDychko</i>
Course placement	<i>Google Classroom</i>

Curriculum of the discipline

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

The Purpose of the Discipline.

The main purpose of the discipline "Environmental Management" is to form students' ability to solve complex specialized problems and practical problems of environmental management, which involves management decisions in the system of environmentally sustainable activities of enterprises in the industry.

The discipline "Environmental Management" studies the concepts of environmentally friendly technological solutions, environmental aspects of the enterprise, organization, production and assessment of their impact on environmental components, environmental management system at the enterprise.

General competencies (OPP was put into effect by the Rector's Order NON/ 89/2021 of 19.04.2021):

- **GC 1** - Ability to apply knowledge in practical situations.
- **GC 2** - Knowledge and understanding of the subject area and understanding of professional activity.
- **GC 6** - Ability to search, process and analyze information from various sources.
- **GC 7** - Ability to generate new ideas (creativity).
- **GC 8** - Ability to make well-grounded decisions.

Special (professional) competencies (OPP was put into effect by the Rector's Order NON/ 89/2021 of 19.04.2021):

- **PC 3** - Ability to study and apply new methods and tools for analysis, modeling, design and optimization of medical devices and systems.
- **PC 5** - Ability to apply physical, chemical, biological and mathematical methods in the analysis, modeling of the functioning of living organisms and biotechnical systems.
- **PC 14** - Ability to perfect experiments according to specified technical and medical methods, perform computer processing, analysis and synthesis of the results.

The program learning outcomes after studying the discipline "Environmental Management" are (OPP was put into effect by the Rector's Order NON/ 89/2021 of 19.04.2021):

- **PLO 8** - Proficiency in a foreign language to an extent sufficient for general and professional communication.
- **PLO 17** - Knowledge of general information about the human body and its functions from the standpoint of a systems approach and their use in biomedical engineering.
- **PLO 25** - Formulation of logical conclusions and substantiation of recommendations on assessment, operation and implementation of biotechnical, medical-technical and bioengineering means and methods.
- **PLO 26** - Management of complex actions or projects that require engineering decisions under unpredictable conditions.
- **PLO 29** - Communicate professionally with health professionals in the national and foreign languages (English or one of the other official EU languages) and understand their requirements for biomedical products and services.
- **PLO 33** - Planning, organization and control of medical and technical and bioengineering systems and processes.
- **PLO 45** - Improvement of technical elements of medical devices and systems and medical devices in the process of professional activity.

2. Prerequisites and postrequisites of the discipline (place in the structural and logical scheme of education according to the relevant educational program)

The discipline "Environmental Management" is an interdisciplinary study that integrates according to its subject knowledge from other disciplines: physics, biochemistry, mathematics, etc.

The acquired practical skills and acquired theoretical knowledge during the study of the discipline "Environmental Management" can be used in the disciplines:

- *from the cycle of general training (educational-professional program "Medical Engineering"):*
"Business Law";
- *Diploma design.*

3. The content of the discipline

The main sections and topics considered in the course:

Section 1. Theoretical and practical foundations of environmental protection

Topic 1.1. The impact of human activities on the environment

Topic 1.2. Existing norms and standards for environmental protection

Section 2. Environmental management and marketing

Topic 2.1. Environmental management: theoretical and practical aspects

Topic 2.2. Fundamentals of environmental marketing

Topic 2.3. Organization of environmental management system

Section 3. Environmental audit

Topic 3.1. Environmental audit

Topic 3.2. Modern technologies of environmental management and audit

Modular control work

4. Training materials and resources

Basic literature:

1. A.K. De—*Environmental Chemistry, 6th edition, New Age International (P) Ltd. New Delhi (2006).*
2. A.K. De—*Environmental Studies, Rural Technology Centre, University of Burdwan (1999), chapters 1-4.*
3. T.M. Das—*Man, an Endangered Species, Shaibya Prakashan, Kolkata (1995).*
4. T.M. Das—*Is the Earth for Man Only? Jonaki Publishers, Kolkata, 4th edition, (1995).*
5. T.M. Khosoo—*Environmental Priorities in India and Sustainable Development, Indian Science Congress Association, New Delhi (1986).*
6. D.D. Monte—*Temples or Tombs? Centre for Science and Environment, New Delhi (1985).*
7. A.K. Mitra—*Urban Environment in Crisis, New Age International (P) Ltd., New Delhi (2000).*
9. G.D. Friedman—*Primer of Epidemiology, 3rd ed., McGraw-Hill, New York (1988).*

Additional literature:

1. Галушкіна Т. П., Грановська Л. М., Кисельова Р. А. Екологічний менеджмент та аудит: навчальний посібник. Херсон: Олді-Плюс, 2019. 455 с.
2. Екологічне управління бізнесом в умовах євроінтеграції: навчальний посібник / П. Д. Дудкін та ін. Тернопіль: ФОП Паляниця В. А., 2018. 200 с.
3. Міронова Н. Г., Білецька Г. А. Екологічна стандартизація і сертифікація: навчальний посібник. Львів: Новий Світ - 2000, 2018. 140 с.
4. Зіновчук Н. В., Ращенко А. В. Екологічний маркетинг: навч. посіб. Житомир: видавництво ЖДУ ім. І. Франка, 2015. 190 с. URL: <http://ir.znau.edu.ua/handle/123456789/3786>.
5. Жигуц Ю. Ю., Лазар В. Ф. Інженерна екологія: навчальний посібник для студентів технічних спеціальностей. Київ: Кондор, 2018. 168 с.
6. Єремеєв, І.С., Дичко А.О. Моніторинг довкілля: навчальний посібник. К.: НТУУ «КПІ». – 2016. 500 с.

Educational content

5. Methods of mastering the discipline (educational component)

№ s/n	Subject	Program learning outcomes	The main tasks	
			Control measure	Deadline
1.	The impact of human activities on the environment	PLO 8 PLO 17 PLO 45	Practical works 1, 2	Week 1-4
2.	Existing norms and standards for environmental protection	PLO 8 PLO 17	Practical work 3	Week 5-6
3.	Environmental management: theoretical and practical aspects	PLO 25 PLO 26	Practical work 4	Week 7-8
4.	Fundamentals of environmental marketing	PLO 4 PLO 16	Practical work 5	Week 9-10
5.	Organization of environmental management system	PLO 26 PLO 29 PLO 33 PLO 45	Practical work 6	Week 11-12

6.	<i>Environmental audit</i>	<i>PLO 25 PLO 33</i>	<i>Practical work 7</i>	<i>Week 13-14</i>
7.	<i>Modern technologies of environmental management and audit</i>		<i>Practical work 8</i>	<i>Week 15-16</i>
8.	<i>Modular control work</i>	<i>PLO 8 PLO 17 PLO 25 PLO 26 PLO 29 PLO 33 PLO 45</i>	<i>Practical work 9</i>	<i>Week 17</i>
9.	<i>Test</i>	<i>PLO 8 PLO 17 PLO 25 PLO 26 PLO 29 PLO 33 PLO 45</i>		<i>Week 18</i>

6. Independent student work

The methodology of self-study of the discipline is a comprehensive mastery of the material through: a lecture course, practical work, as well as attending exhibitions and seminars on modern technologies of environmental management and protection, followed by discussion of the results of visits and reports. During the practical classes it is also rational to discuss the materials of publications (recommended by the teacher for study during independent work), which cover the latest achievements in the field of environmental management, as well as the experience of their implementation.

In the process of independent work, students should use personal computers to complete tasks, compile reports on independent work and visit exhibitions.

Independent work of students in studying the course is carried out in the following forms:

- 1. Elaboration of lecture material and its supplementation with some questions or deepening of the considered problems which are taken out for more detailed studying on practical employments.*
- 2. Preparation for practical work.*
- 3. Preparation for control work.*
- 4. Preparation for the test.*

Policy and control

7. Policy of academic discipline (educational component)

Attending classes

Attendance at lectures is optional. Attending practical classes is desirable, as they are used to write express tests / tests, as well as to defend practical work.

The grading system is focused on obtaining points for student activity, as well as performing tasks that are able to develop practical skills and abilities.

Control measures missed

Missed control measures (defense of practical work) must be practiced in the next classes, provided that the task is scheduled for the current lesson, or in consultations.

Missions of writing a module test and express test are not fulfilled.

Violation of deadlines and encouragement points

Encouragement points		Penalty points *	
Criterion	Weight points	Criterion	Weight points
Improving practical work	1 point (for each practical work)	Untimely implementation and test of practical work	From -0.5 points to -5 points (depending on the delivery date)
Passing distance courses on topics that are agreed with teachers	5 points	Untimely execution and test of calculation and graphic work	From -2 points to -20 points (depending on the construction period)
Registration of scientific work for participation in the competition of student scientific works	10 points		
Writing abstracts, articles, participation in international, national and / or other events or competitions on the subject of the discipline	5 points		

* if the control measure was missed for a good reason (illness, which is confirmed by a certificate of the established sample) - penalty points are not accrued.

Academic integrity

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

Norms of ethical behavior

Normative principles of behavior of students and employees, defined in sections 2 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". Read more: <https://kpi.ua/code>.

Procedure for appealing the results of control measures

Students have the opportunity to raise any issue related to the control procedure and expect it to be addressed according to predefined procedures.

The student has the right to appeal the results of the control measure according to the approved provision on appeals in the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (approved by the order №NON/128/2021 from 20.05.2021) - <https://osvita.kpi.ua/index.php/node/182>

Inclusive education

The discipline "Environmental Management" can be taught to most students with special educational needs.

Distance learning

Distance learning takes place through the "Google Class".

Distance learning through additional online courses on certain topics is allowed subject to agreement with students. If a small number of students wish to take an online course on a specific topic, studying the material with such courses is allowed, but students must complete all the tasks provided in

the discipline.

The list of courses is offered by the teacher after the students have expressed a desire (because the bank of available courses is updated almost every month).

The student provides a document confirming the completion of the distance course (in the case of a full course) or provides practical tasks from the distance course and subject to an oral interview with the teacher on the topics can receive grades for control measures provided for the studied topics (express control / test tasks, practical work).

Performance of practical works, and also performance of settlement and graphic work, is carried out during independent work of students in a remote mode (with a possibility of consultation with the teacher through e-mail, social networks).

Learning the discipline in a foreign language

Teaching in English is carried out for foreign students.

At the request of students, it is allowed to study the material with the help of English-language online courses on topics that correspond to the topics of specific classes.

8. Monitor and evaluate the system of evaluation of learning outcomes (Rating System of Evaluation)

Evaluation system (current control):

No s/ n	Control measure	%	Weight points	Number	Total
1.	Express control works / test tasks	20	5	4	20
2.	Assessment of practical works	40	5	8	40
3.	Modular control work (MCW)	40	40	1	40
4.	Test	80	80	1	80
	Total				100

The student receives a positive credit score for the results of the semester, if he has a final rating for the semester of at least 60 points and has met the conditions of admission to the semester control, which are determined by the Syllabus.

With applicants who have met all the conditions of admission to the test and have a rating of less than 60 points, as well as with those applicants who want to increase their rating, in the last scheduled lesson in the semester, the teacher organizes semester control in the form of test or interviews. After performing the test, if the score for the test is higher than the rating, the applicant receives a score based on the results of the test.

If the grade for the test is lower than the rating, the previous rating of the applicant (except for points for the semester individual task) is canceled and he receives a grade based on the results of the test. This option forms a responsible attitude of the applicant to the decision to perform the test, forces him to critically assess the level of his training and carefully prepare for the test.

Calendar control (CC) - is carried out twice a semester as monitoring of the current state of compliance with the requirements of the syllabus.

The purpose of calendar control is to improve the quality of student learning and monitor the implementation of the schedule of the educational process by students.

Criterion	The first CC	The second CC
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Deadline of calendar controls		8th week	14th week	
Conditions for obtaining a positive result from the calendar control	Current rating		≥ 24 points	≥ 42 points
	Practical work	PW № 1- 4	+	+
		PW № 5-7	-	+
	Express control works / test tasks	At least 4 of any lectures	+	-
		At least 7 of any lectures	-	+
Modular control work	Assessed MCW	-	+	

In case of detection of academic poor quality during training - the control measure is not credited.

Semester certification of students

Mandatory condition for admission to the test		Criterion
1	Current rating	$RD \geq 42$
2	All practical works are tested	More than 16 points
3	Writing at least 6 express tests / tests	More than 8 points

The results are announced in the presence or remotely. Also recorded in the system "Electronic Campus".

Optional conditions for admission to closure:

- 1. Activity during practical classes.*
- 2. Positive result of the first attestation and the second attestation.*
- 3. Attending lectures.*

Table of translation of rating points to grades on a university scale:

Total rating points	Grades according to the university scale
100-95	Excellent
94-85	Very good
84-75	Good
74-65	Satisfactory
64-60	Passed
Below 60	Unsatisfactory
Violation of passing requirements	Not passed

9. Additional information on the discipline (educational component)

The list of questions for preparation for modular control work, and also for preparation for credit is given in appendix 1.

Distance learning through additional online courses on certain topics is allowed subject to agreement with students. If a small number of students wish to take an online course on a specific topic, studying the material with such courses is allowed, but students must complete all the tasks provided in the discipline.

The list of courses is offered by the teacher after the students have expressed a desire (because the bank of available courses is updated almost every month).

The student provides a document confirming the completion of the distance course (in the case of a full course) or provides practical tasks from the distance course and subject to an oral interview with the teacher on the topics can receive grades for control measures provided for the studied topics (express control / test tasks, practical work).

Work program of the discipline (syllabus):

Compiled by prof. Alina Dychko

Approved by the Department of Biomedical Engineering (protocol № ____ from 25 June 2021)

Approved by the Methodical Commission of the Faculty of Biomedical Engineering (protocol № __ from 27 August 2021)

The list of questions for preparation for modular control work as well as for preparation for test

1. Environmental management in terms of environmentally oriented development of society
2. Environmental management and audit: general concepts and terminology Environmental management
3. Environmental audit
4. System of corporate environmental management, marketing and audit
5. Management's response to the environmental opportunities and risks of a modern enterprise
6. Environmental management at the enterprise: theoretical analysis
7. The concept of corporate environmental management
8. Fundamentals of environmental management
9. Theoretical foundations of environmental management
10. Formation of the eco-management system
11. Environmental management of the enterprise
12. Functional areas of eco-management within the enterprise
13. Organization of environmental management at the enterprise
14. International standards series ISO 14000. Prerequisites and stages of implementation
15. Prerequisites for the development of ISO 14000 standards
16. Stages of development of ISO 14000 standards
17. British standard BS 7750
18. DNV, OHSMS, BS 8800: Standards for health and safety management systems
19. OHSAS 18001 - Personnel safety and health management
20. HACCP: Analysis of risks and points of critical control
21. SA 8000 - Standard for assessing the social aspects of management systems
22. International standards of the ISO 14000 series world and domestic experience of implementation
23. Advantages of using ISO 14000 standards
24. Experience in implementing ISO 14000 standards
25. Stages of development of the environmental management system of the enterprise
26. Qualitative assessment of the effectiveness of environmental management systems (assessment of environmental sustainability of industrial enterprises)
27. Fundamentals of environmental audit
28. Definition of environmental audit
29. The main purpose and objectives of environmental audit of the enterprise
30. Levels of eco-audit
31. Forms of environmental audit
32. Status of environmental audit
33. Objects and subjects of eco-audit
34. Problems of formation and development of environmental audit
35. The scope of the eco-audit
36. The procedure for conducting an audit
37. Legislative framework for environmental audit
38. Basic terminology
39. Legal grounds for conducting an environmental audit
40. Requirements, rights and responsibilities of auditors, customers and owners of audited entities
41. Recommendations for auditing according to ISO 19011
42. Scope of the ISO 19011 standard (DSTU ISO 19011)
43. Approach to conducting an audit in accordance with the requirements of ISO 19011
44. Purpose and scope of the audit program
45. Types of environmental audit

46. Tasks of environmental audit
47. The main areas of implementation of EA
48. EA products
49. EA terrain
50. Methods of comprehensive environmental audit
51. Audit of minimization of production waste
52. The concept of "waste"
53. Waste minimization audit methodology
54. Experience in forming a system of environmental management and audit
55. CEM-EMAS around the world