



**Environmental Protection Organization and Management**  
**Work program of the discipline (Syllabus)**

**Details of the discipline**

Level of higher education	<i>First (bachelor's)</i>
Field of knowledge	<i>10 Natural sciences</i>
Speciality	<i>101 Ecology</i>
Educational program	<i>Environmental safety</i>
Discipline status	<i>Normative</i>
Form of study	<i>full-time (day)/remote/mixed</i>
Year of preparation, semester	<i>4th year, autumn and semester</i>
Scope of discipline	<i>4 (120)</i>
Semester control/ control measures	<i>Exam</i>
Schedule of classes	<i>3 hours a week (2 hours of lectures and 1 hour of practical classes)</i>
Language of instruction	<i>Ukrainian</i>
Information about the course / teachers	Lecturer: <a href="https://eco-paper.kpi.ua/pro-kafedru/vykladachi/trus-inna-mikolajivna.html">https://eco-paper.kpi.ua/pro-kafedru/vykladachi/trus-inna-mikolajivna.html</a> Practical /Seminar: <a href="https://eco-paper.kpi.ua/pro-kafedru/vykladachi/trus-inna-mikolajivna.html">https://eco-paper.kpi.ua/pro-kafedru/vykladachi/trus-inna-mikolajivna.html</a>
Course placement	<a href="https://do.ipu.kpi.ua/course/view.php?id=2597">https://do.ipu.kpi.ua/course/view.php?id=2597</a>

**The program of the discipline**

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

*The implementation of not sufficiently sound recommendations for the restructuring of society led to a financial crisis. In addition, there is an environmental crisis due to irrational environmental management and deep negative changes in the socio-economic and environmental development of the country. Today, among European countries, Ukraine has one of the highest integral indicators of anthropogenic load on the environment. Inconsistency in the actions of state and local authorities, the unsatisfactory state of the state environmental monitoring system, the inability of the current ecological and economic mechanism of environmental management to arouse the interest of business entities in reducing the eco-destructive impact led to an economic and environmental crisis in the field of environmental protection.*

*In order to effectively regulate the impact of human production and economic activity on the environment, it is necessary to ensure the organization of the environmental management process, which includes reorientation from obtaining short-term economic benefits to fulfilling long-term obligations in the field of managing environmental protection processes, ensuring the environmental safety of the enterprise, which will have financial benefits for society, because the elimination of the consequences environmental degradation is much more expensive than eliminating the causes of degradation.*

*The adoption of the Law "On the Basic Principles (Strategy) of the State Environmental Policy of Ukraine until 2030" testifies to the awareness of the need to restructure environmental policy at all levels and further introduce an ecosystem approach into sectoral policy and improve the integrated environmental management system.*

*Consolidation of changes in the public administration system by reforming the system of state environmental management, implementation of European environmental standards and norms, improvement of environmental accounting and control systems, introduction of financial and economic mechanisms for stimulating environmentally oriented structural transformations in the economy, introduction of mechanisms to stimulate enterprises to energy efficiency, introduction of e-government, dissemination of environmental knowledge, increase environmental consciousness of society, informatization of the sphere of environmental protection and environmental management will stabilize the ecological situation.*

*The development of the environmental management system will be facilitated by the introduction of international standards of environmental management systems in enterprises and companies.*

**The subject of the discipline "Environmental Protection Organization and Management"** *is the implementation of approaches that will ensure the introduction of an ecosystem approach to sectoral policy and improvement of the integrated environmental management system, the introduction of international standards of environmental management systems at enterprises and companies, which will help prevent man-made and environmental disasters and improve the state of the environment.*

**The purpose of the discipline "Environmental Protection Organization and Management"**

*The purpose of studying the discipline "Organization and management of environmental activities" is to obtain by future specialists basic knowledge about the modern understanding of systemic theoretical and methodological ideas about environmental management in the context of global trends in the greening of human life, preparation for the practical application of this knowledge in state institutions and enterprises of regional and local levels. Requires the formation of students' competencies:*

- understanding of the main theoretical provisions, concepts and principles of mathematical and socio-economic sciences;*
- the ability to use basic principles and components of environmental management;*
- the ability to participate in the development of a management system and handling of production and consumption waste;*
- the ability to inform the public about the state of environmental safety and balanced nature management;*
- the ability to master international and domestic experience in solving regional and cross-border environmental problems;*
- the ability to participate in the management of environmental actions and/or environmental projects;*
- the ability to develop projects for calculating maximum permissible discharges and emissions, to monitor compliance with MPD, MPE.*

*According to the requirements of the program of the discipline "Environmental Protection Organization and Management", students after mastering it must demonstrate the following programmatic learning outcomes:*

- to demonstrate an understanding of the basic principles of management of environmental actions and / or environmental projects;*
- to understand the basic environmental laws, rules and principles of environmental protection and nature management;*
- to use the management principles on which the environmental safety system is based;*
- to identify the factors that determine the formation of landscape and biological diversity;*
- to solve problems in the field of environmental protection using generally accepted and / or standard approaches and international and national experience;*
- to demonstrate skills in assessing unforeseen environmental problems and making informed choices of their solving;*
- to be able to predict the impact of technological processes and industries on the environment;*
- to participate in the development and implementation of projects aimed at optimal management and treatment of industrial and municipal waste;*

- to be able to form effective communication strategies in order to convey ideas, problems, solutions and personal experience in the field of ecology;
- to be able to communicate the results of activities to a professional audience and the general public, to make presentations and messages;
- to be able to explain the social, economic and political consequences of implementing environmental projects;
- to choose the optimal strategy for holding public hearings on the problems and formation of the territories of the nature reserve fund and the ecological network;
- to be able to form requests and determine actions that ensure compliance with the norms and requirements of environmental legislation;
- to participate in the development of projects and practical recommendations for environmental protection;
- to demonstrate skills in implementing environmental measures and projects.

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

The study of the discipline "**Environmental Protection Organization and Management**" is based on the principles of integration of various knowledge gained by students during the three years of undergraduate studies in the study of natural and engineering-technical disciplines: "Environmental Monitoring", "Waste Disposal and Recovery", "Rationing of anthropogenic impact on the environment", "Environmental legislation and environmental law".

The discipline "**Environmental Protection Organization and Management**" is a fundamental basis for studying the following disciplines: "Environmental and natural-technogenic safety" and ensures the implementation of a bachelor's project.

## **3. Contents**

### **Section 1. Normative and methodological bases of environmental management**

Topic 1. Implementation of the principles of the state environmental policy in Ukraine

Topic 2. Development of environmental management

### **Section 2. Environmental management systems**

Topic 3. General provisions of the state system of environmental management

Topic 4. General characteristics of the corporate environmental management system.

Topic 5. The system of public environmental management and local environmental self-government

### **Section 3. Special functions of state environmental management**

Topic 6. Application of administrative tools for the implementation of state environmental policy

Topic 7. Environmental audit

Topic 8. Legal liability for violation of environmental law

### **Section 4. Implementation of an ecosystem approach to sectoral policy and improvement of the integrated environmental management system**

Topic 9. Environmental management as a prerequisite for sustainable development

Topic 10. Management in the field of protection of natural resource potential of Ukraine

### **Section 5. Economic mechanisms of environmental management**

Topic 11. Payment for natural resources and sources of their formation

Topic 12. Determining the amount of payment and collection of payments for environmental pollution in Ukraine

Topic 13. Economic, environmental and social effectiveness of environmental measures

### **Section 6. Basic principles of international experience in environmental safety management in the context of balanced development**

Topic 14. Improving the efficiency of public administration in Ukraine, taking into account international experience

Topic 15. Environmental education

## 4. Learning materials and resources

### **Basic literature**

1. *Ecological aspects of environmental quality management: textbook / I.M. Trus, Y.V. Radovenchyk, M.D. Gomelya. – K.: Condor Publishing House, 2020. – 208 p.*
2. *Organization and management of me in environmental activities: teaching staff / N. M. Samoylenko, D. V. Raiko, V. I. Averchenko. – Kharkiv: NTU "KhPI", Publishing House "Leader", 2018. – 174 p.*
3. *From the action of Ukraine "On the Basic Principles (Strategy) of the State Environmental Policy of Ukraine for the Period until 2030"*  
[http://search.ligazakon.ua/l\\_doc2.nsf/link1/T192697.html](http://search.ligazakon.ua/l_doc2.nsf/link1/T192697.html)
4. *Law of Ukraine "On Environmental Protection"*  
<https://zakon.rada.gov.ua/laws/show/1264-12#Text>
5. *On the protection of atmospheric air*  
<https://zakon.rada.gov.ua/laws/show/2707-12#Text>
6. *Water Code of Ukraine*  
<https://zakon.rada.gov.ua/laws/show/213/95-%D0%B2%D1%80#Text>
7. *Law of Ukraine "On Waste"*  
<https://zakon.rada.gov.ua/laws/show/187/98-%D0%B2%D1%80#Text>
8. *Subsoil Code of Ukraine*  
<https://zakon.rada.gov.ua/laws/show/132/94-%D0%B2%D1%80#Text>
9. *Land Code of Ukraine*  
<https://zakon.rada.gov.ua/laws/show/2768-14#Text>
10. *Convention on the Protection of Biological Diversity of 1992*  
[https://zakon.rada.gov.ua/laws/show/995\\_030#Text](https://zakon.rada.gov.ua/laws/show/995_030#Text)
11. *Forest Code of Ukraine*  
<https://zakon.rada.gov.ua/laws/show/3852-12#Text>
12. *Law of Ukraine "On the Nature Reserve Fund of Ukraine"*  
<https://zakon.rada.gov.ua/laws/show/2456-12#Text>
13. *Tax Code of Ukraine dated 01.01.2022*  
<https://zakon.rada.gov.ua/laws/show/2755-17#Text>
14. *Law of Ukraine "On Payment for Land"*  
<https://zakon.rada.gov.ua/laws/show/2535-12#Text>

### **Further reading**

1. *Law of Ukraine "On State Control over the Use and Protection of Land"*  
<https://zakon.rada.gov.ua/laws/show/963-15#Text>
2. *Law of Ukraine "On the National Program of Toxic Waste Management"*  
<https://zakon.rada.gov.ua/laws/show/1947-14#Text>
3. *Law of Ukraine "On Radioactive Waste Management"*  
<https://zakon.rada.gov.ua/laws/show/255/95-%D0%B2%D1%80#Text>
4. *Decree of the Cabinet of Ministers of Ukraine of November 8, 2017 No 820 "On Approval of the National Waste Management Strategy in Ukraine until 2030"*  
<https://zakon.rada.gov.ua/laws/show/820-2017-%D1%80#Text>
5. *Regulations on the State Agency of Water Resources of Ukraine, approved by the Resolution of the Cabinet of Ministers of Ukraine dated August 20, 2014 No. 393*  
<https://zakon.rada.gov.ua/laws/show/393-2014-%D0%BF#n8>
6. *Regulations on the State Agency of Forest Resources of Ukraine, approved by the Resolution of the Cabinet of Ministers of Ukraine of October 8, 2014, No. 521*  
<https://zakon.rada.gov.ua/laws/show/521-2014-%D0%BF#n8>
7. *Regulations on the State Agency of Ukraine on Exclusion Zone Management, approved by the Resolution of the Cabinet of Ministers of Ukraine of October 22, 2014 No. 564*

<https://zakon.rada.gov.ua/laws/show/564-2014-%D0%BF#n8>

8. *Regulations on the State Service of Geology and Subsoil of Ukraine, approved by the Resolution of the Cabinet of Ministers of Ukraine of December 30, 2015, No. 1174*

<https://zakon.rada.gov.ua/laws/show/1174-2015-%D0%BF#n8>

9. *Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters*

[https://zakon.rada.gov.ua/laws/show/994\\_015#Text](https://zakon.rada.gov.ua/laws/show/994_015#Text)

### **Information resources on the Internet**

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

## **Educational content**

### **5. Methods of mastering the discipline (educational component)**

#### **Lectures**

*Lectures are aimed at:*

- *provision of modern, holistic, interdependent knowledge of the discipline "Environmental Protection Organization and Management", 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;*
- *determining the effectiveness of the implementation of the national environmental policy, forecasting the prospects and directions of development for the coming years;*
- *reflection of the methodological processing of the material for its better perception (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;*
- *availability of the information presented for perception by this audience.*

<b>No s/n</b>	<b>The title of the lecture topic and the list of main issues (list of didactic tools, references to literature and tasks for the SRS)</b>	<b>Hours</b>
<b>Section 1. Normative and methodological bases of environmental management</b>		
1	<b>Topic 1. Implementation of the principles of the state environmental policy in Ukraine</b> <i>Existing problems and the current state of the environment in Ukraine. The purpose, principles, principles and tools of the state environmental policy. Strategic goals and objectives of the state environmental policy.</i> <i>Literature: [1] p. 7-11; [2] c. 7-49; 3.</i> <i>Tasks on the SRS. Principles and functions of management. Procedures of the management process.</i>	2
2	<b>Topic 2. Development of environmental management</b> <i>Stages of development of the field of environmental management in Ukraine and abroad. Requirements for environmental management</i> <i>Literature: [1] pp. 14-23; [2] c. 49-52.</i> <i>Tasks on the SRS. Mechanisms of environmental management. Place and role of management decisions in the process of functioning of the enterprise.</i>	2

<b>Section 2. Environmental management systems</b>		
3	<p><b>Topic 3. General provisions of the state system of environmental management</b>  <i>Functions and hierarchy of the statesystem of environmental management. Literature: [2] pp. 56-89. Tasks on the SRS. Levels of environmental management.</i></p>	2
4	<p><b>Topic 4. General characteristics of the corporate environmental management system.</b>  <i>Fundamental approaches, basic principles of creating a corporate governance system. The essence and mechanisms of corporate governance. Charter of the International Chamber of Commerce, its principles. Environmental aspects of requirements for management personnel. Literature: [2] pp. 94-136. Tasks for independent work: Standard system requirements for the environmental policy of corporations.</i></p>	2
5	<p><b>Topic 5. The system of public environmental management and local environmental self-government</b>  <i>The role and functions of public environmental ingovernment. Aarhus Convention. Forms of public participation. Functions of public environmental management. Role of non-governmental organizations in the process of implementing the principles of balanced development at all levels. Forms of public participation in environmental activities. Means and mechanisms of public involvement in environmental activities. Environmental aspects and functions of local self-government. Strategic tasks of local authorities. Literature: [2] pp. 137-142. Tasks on the SRS. Basic principles of local environmental policy. Solution of local environmental programs in the countries of Central and Eastern Europe.</i></p>	2
<b>Section 3. Special functions of state environmental management</b>		
6	<p><b>Topic 6. Application of administrative tools for the implementation of state environmental policy</b>  <i>Aboutthe price of environmental impact. The current state of the process of implementing environmental certification in Ukraine. Basic principles and benefits of environmental certification. The purpose and principles of environmental licensing. Environmental certification and insurance. Environmental monitoring. Environmental quality standards. Methods for determining environmental risk. The purpose, objectives, features of the development of materials for assessing the impact on the environment. Evaluation and selectionof environmental characteristics. Product life cycle. Eco-labeling. Matrix of choice of criteria for ecological purity. Environmental marketing, engineering. The task of environmental engineeringin relation to the creation and implementation of prorodoprotective products. Objects and subjects of leasing. Environmental management. Literature: [1] pp. 110-157; 164-202; [2] c. 43-46. Tasks on the SRS. Ecological regulation. The procedure for the development and approval of standards for maximum permissible emissions and discharges of pollutants. The procedure for the development of materials for assessing the impact on the environment. Ecological modernization of production. Types of wear. Voluntary and mandatory certification. Maximum permissible concentration, maximum permissible discharge and maximum permissible load.</i></p>	4
7	<p><b>Topic 7. Environmental audit</b>  <i>Tasks and benefits of conducting an environmental audit. Objects and subjects of audit. Audit conditions. Ecoaudit in Ukraine. Drawing up an audit report. Literature: [1] pp. 157-163; [2] c. 43-46. Tasks on the SRS. To provide a system of goals for a comprehensive express eco-</i></p>	2

	<i>audit of the enterprise.</i>	
8	<p><b>Topic 8. Legal liability for violation of environmental law</b>  <i>Classification of environmental offenses. Disciplinary, civil law (property), criminal, administrative types of liability</i>  <i>Literature: [2] pp. 43-46; [4].</i>  <i>Tasks on the SRS. Types of disciplinary actions</i></p>	2
<p><b>Section 4. Implementation of an ecosystem approach to sectoral policy and improvement of the integrated environmental management system</b></p>		
9	<p><b>Topic 9. Environmental management as a prerequisite for sustainable development</b>  <i>Managing the quality of atmospheric air. Management in the field of water protection. Protection of lands and soils. Waste management. Public administration in the field of protection, protection and reproduction of forests. Subsoil.</i>  <i>Literature: [1] pp. 32-33; [3].</i>  <i>Tasks on the SRS. The current state of surface and groundwater in Ukraine. The current state of atmospheric air in Ukraine. The current state of soils and land resources of Ukraine. Analysis of world and domestic experience in implementing integrated water management.</i></p>	2
10	<p><b>Topic 10. Management in the field of protection of natural resource potential of Ukraine</b>  <i>Ecological network of Ukraine is a modern concept of conservation of biological and landscape diversity. Climate change. Emergencies. Exclusion zone and zone of stipulated(mandatory) resettlement. Biological safety.</i>  <i>Literature: [3].</i>  <i>Tasks on the SRS. El Niño and La Niña phenomena as phenomena of global climate anomaly</i></p>	2
<p><b>Section 5. Economic mechanisms of environmental management</b></p>		
11	<p><b>Topic 11. Payment for natural resources and sources of their formation</b>  <i>Methods of economic management of rational environmental management.</i>  <i>Payments for resources, their types and standards. Rent for the use of subsoil for the extraction of minerals. Rent for the use of subsoil for purposes not related to the extraction of minerals. Rent for the use of the radio frequency resource of Ukraine. Rent for special use of water. Rent for specialuse of forest resources. Payment for land resources.</i>  <i>Literature: [1] pp. 89-101.</i>  <i>Tasks on the SRS. Standards of payment for the use of natural resources</i></p>	4
12	<p><b>Topic 12. Indetermining the amount of payment and collection of payments for environmental pollution in Ukraine</b>  <i>Payments for pollution, their types and accrual criteria. Determination of the amount of payment for emissions of pollutants into the atmosphere by stationary andpe-removing sources of pollution. The amount of payments for discharges into surface waters, territorial and inland sea waters and underground horizons. Calculation of the amount of payments for the disposal of waste in the environment.</i>  <i>Literature: [1] c. 88-101.</i>  <i>Tasks on the SRS. Get acquainted with the methodology for determining the amount of damage caused to land, soils as a result of emergencies and / or armed aggression and hostilities during martial law</i></p>	4
13	<p><b>Topic 13. Economic, environmental and social efficiency of environmental measures</b>  <i>Types of calculations of economic losses: actual, possible, averted, liquidated, potential losses. Social, environmental and economic results of environmental measures. Factors influencing the economic efficiency of the implementation of</i></p>	2

	<p>environmental measures. Literature: [1] p. 102-106. Tasks on the SRS. Net economic effect. Total (absolute) economic efficiency of capital investments.</p>	
<p><b>Section 6. Basic principles of international experience in environmental safety management in the context of balanced development</b></p>		
14	<p><b>Topic 14. Improving the efficiency of public administration in Ukraine, taking into account international experience</b> United Nations Development Programme. Cooperation of Ukraine with international environmental organizations. Management approaches to ensuring the rational use of natural resources from the standpoint of analyzing foreign management practices in this area. Literature: [1] pp. 23-32; [3]. Tasks on the SRS. Modern public funds and organizations involved in the protection and restoration of the environment.</p>	2
15	<p><b>Topic 15. Environmental education</b> Ecological education of the population is an important component of the international environmental policy of countries. Development and formation of formal and non-formal education at the Department of Ecology and Technology of Plant Polymers of Igor Sikorsky Kyiv Polytechnic Institute. Literature: [2] c. 43-46. Tasks on the SRS. Environmental education in developed countries.</p>	2
	<b>Just</b>	<b>36</b>

### Practical classes

In the system of professional training of students in this discipline, practical classes occupy 33.3% of the classroom load. Topics that cover a wide range of issues are submitted for practical classes, they allow you to better understand the lecture material, master the methodology for assessing economic losses for environmental pollution, find out the impact of individual groups of pollutants on the environment and assess the degree of environmental risks, form an idea of environmental management systems and appropriate mechanisms for its implementation.

The content of these classes and the methods of their conduct should ensure the development of the creative activity of the individual. They develop scientific thinking and 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 to systematize, consolidate and deepen theoretical knowledge in the field of organization and management of environmental activities;
- teach students techniques for solving practical problems,
- to promote the mastery of skills and abilities to perform calculations, graphic and other tasks;
- teach them to work with scientific and reference literature and diagrams;
- to form the ability to learn independently, that is, to master the methods, methods and techniques of self-learning, self-development and self-control.

No s/n	The title of the topic of the practical lesson and the list of main issues (list of didactic support, references to literature and tasks to the SRS)	Hours
1	<p><b>Public administration in the field of use and protection of atmospheric air</b> Law of Ukraine "On Protection of Atmospheric Air". Atmospheric air management in Ukraine. Measures to reduce air pollution. State accounting and monitoring in the</p>	2



	<p>field of air protection. The purpose, tasks of managing environmental activities in the field of atmospheric air. Standards regulating the management of atmospheric air in Ukraine. Characteristics of sources of emissions into the atmospheric air. Air pollution by road in Ukraine. Offenses in the field of air protection.</p> <p>Literature: 1 [32-48], 5.</p> <p>Tasks for independent work: The current state of atmospheric air in Kyiv and the determination of sources of its pollution. Monitoring of the State Hydrometeorological Service of Ukraine.</p>	
2	<p><b>Public administration in the field of water use and protection and water resources reproduction</b></p> <p>Water Code of Ukraine and WaterFramework directives a EU (Directive 2000/60/EC). Water Fund of Ukraine. Classification of bodies that manage in the field of water use and protection. Competence of public administration bodies in the field of water use and protection. Control over the use and protection of water and reproduction of water resources. Adaptation of Ukrainian legislation in the field of water protection to European legislation. Economic regulation of rational use and protection of water and reproduction of water resources. Rationing in the field of use and protection of water and reproduction of water resources. Responsibility for violation of water legislation</p> <p>Literature: 1 [49-69], 6.</p> <p>Tasks for independent work: The current state of water bodies of the hydrosphere. Territorial distribution of water resources of Ukraine. Projected fresh groundwater resources of Ukraine.</p>	2
3	<p><b>Public administration in the field of waste management</b></p> <p>Law of Ukraine "On Waste". State Program for Waste Management in Ukraine. Basic legislative and regulatory documents that regulate waste management. Basic principles of state policy in the field of waste management. Integration into the EU waste market and the European waste management system.</p> <p>Literature: 1 [79-89], 7.</p> <p>Tasks for independent work: Waste – as a base of secondary raw materials for industry. Extended manufacturer responsibility. Zero Waste – Refuse, Reduce, Reuse, Recycle, Rot</p> <p>Modular test (1 hour)</p>	1 1
4	<p><b>Public administration in the field of use and protection of mineral resources</b></p> <p>Subsoil Code. Legislative framework for mineral resource management in Ukraine. Public administration bodies in the field of mineral resources management. Public administration bodies in the field of use of natural resources. Land Code of Ukraine. General characteristics of land resources of Ukraine. The purpose of land use management in the exploration and development of mineral deposits. Planning of ways, means and objects of land use management in Ukraine. Characteristics of the Land Fund of Ukraine. Competence of different branches of power in the field of management of environmental activities in agriculture. Economic mechanism of agricultural management. Bodies of state management of environmental activities in agriculture of Ukraine. State control in the field of use, and protection of agricultural land.</p> <p>Literature: 1 [69-78], 8, 9.</p> <p>Tasks for independent work: Mineral resource base of Ukraine and provision of mineral resources for use. Processes of uranium ore mining and processing as the main source of radioactive waste generation. The current state of land resources in Kyiv and the determination of sources of their pollution. Rights and obligations of users of agricultural objects.</p>	2
5	<p><b>Public administration in the field of use and protection of flora and fauna</b></p>	2

	<p><i>State control in the field of protection, use and reproduction of flora Plant resources of Ukraine. Characteristics of biodiversity in Ukraine. Natural areas of Ukraine. Characteristics of representatives of taxa in Ukraine. Modern maximum biodiversity rates. Negative anthropogenic impact on biodiversity in Ukraine. Forecast, growth of "red lists" in Ukraine. Law of Ukraine "On Wildlife". Priority areas of management in the field of animal diversity conservation. Recommendations for practical actions to increase the biodiversity of Ukraine. The main factors of the modern decrease in the sustainability of biodiversity within Ukraine. State control in the field of protection, use and reproduction of wildlife</i></p> <p><i>Literature: 10.</i></p> <p><i>Tasks for independent work: Management in the field of conservation of plant and animal diversity in Ukraine at the regional level (on the example of a specific region).</i></p>	
6	<p><b>State regulation and management in the field of protection and use of territories and objects of nature reserve and forest funds of Ukraine</b></p> <p><i>Law of Ukraine "On the Nature Reserve Fund of Ukraine". Structure and functions of public administration in the field of nature reserve fund. Specially authorized bodies in the field of conservation, the rights of citizens and public organizations. Legislative acts aimed at solving the problems of preserving biological and landscape diversity. Reserves and national natural parks of Ukraine. "On environmental protection". Competences of the Verkhovna Rada of Ukraine, regional, district and city Councils of People's Deputies in the field of regulation of forest relations</i></p> <p><i>Literature: 11, 12.</i></p> <p><i>Tasks for independent work: Public administration in the field of use and protection of the nature reserve fund at the regional level (on the example of a specific region).</i></p>	2
7	<p><b>Public Health Management of Ukraine</b></p> <p><i>Regulatory laws in the field of health care. Ministries responsible for environmental and health issues. Directions of the policy of rehabilitation of the population of Ukraine. Financial and economic mechanism of state regulation of health care. Ways to improve state policy and public administration of the domestic medical industry. Comparative analysis of health policy of the World Health Organization, the Countries of the European Union and Ukraine.</i></p> <p><i>Literature: 3.</i></p> <p><i>Tasks for independent work: A measure of health assessment.</i></p>	2
8	<p><b>Economic methods of environmental management</b></p> <p><i>Economic methods of managing rational environmental management and their types. Economic mechanism of environmental regulation in Ukraine. Payments for resources, their types and standards. The main directions of improving resource taxation. Calculation of payments for environmental pollution, their types and accrual criteria</i></p> <p><i>Literature: 1 [89-106], 13, 14.</i></p> <p><i>Tasks for independent work: Identify the main shortcomings in the mechanism of charging resource payments</i></p>	2
9	<p><b>International experience in environmental management</b></p> <p><i>International programs in the field of environmental protection and environmental management. Environmental policy of developed foreign countries. Specificity of foreign environmental legislation and the mechanism of its validity. International environmental cooperation. Participation of Ukraine in international cooperation in the field of environmental protection</i></p> <p><i>Literature: 3.</i></p> <p><i>Tasks for independent work:</i></p> <p><i>International experience in river basin management. International principles of</i></p>	1

	waste management. Modular test (1 hour)	1
	<b>Just</b>	<b>18</b>

## 6. Independent work of a student / postgraduate student

Independent work takes 55% of the time to study the credit module, including preparation for the exam. The main task of students' independent work is to master scientific knowledge in areas that are not included in the list of lecture questions through personal search for information, the formation of an active interest in a creative approach in educational work. In the process of independent work within the educational component, the student must learn to deeply analyze the issues submitted for consideration, process it and come to their own reasonable conclusions.

No s/n	The name of the topic submitted for independent study	Number of hours of SRS
<b>Section 1. Normative and methodological bases of environmental management</b>		
1	<p><b>Topic 1. Implementation of the principles of the state environmental policy in Ukraine</b></p> <p>The principle of careful intervention. The principle of naturalness. Hierarchies of mixed systems. General problems of harmonization of interaction between society and nature. Economic mechanism of the Law of Ukraine "On Environmental Protection". Modern public funds and organizations involved in the protection and restoration of the environment.</p> <p>Literature: [1] p. 7-11; [2] c. 7-49; 3.</p>	2
2	<p><b>Topic 2. Development of environmental management</b></p> <p>Standard model of environmental management and stages of its implementation. The system of regulatory regulation of environmental management. Stages of implementation of managerial innovations. "Hard" and "soft" control mode.</p> <p>Literature: [1] pp. 14-23; [2] c. 49-52.</p>	2
<b>Section 2. Environmental management systems</b>		
3	<p><b>Topic 3. General provisions of the state system of environmental management</b></p> <p>Subjects of macroecological management. Subjects of microecological management. Levels of environmental management.</p> <p>Literature: [2] pp. 56-89.</p>	2
4	<p><b>Topic 4. General characteristics of the corporate environmental management system.</b></p> <p>Evaluation of the effectiveness of corporate governance. Motivation of staff in management.</p> <p>Literature: [2] pp. 94-136.</p>	2
5	<p><b>Topic 5. The system of public environmental management and local environmental self-government</b></p> <p>Environmental rights and obligations of citizens in the field of public environmental management. Local agenda for the XXI century. Improving the management of settlements.</p> <p>Literature: [2] pp. 137-142.</p>	1
<b>Section 3. Special functions of state environmental management</b>		
6	<p><b>Topic 6. Application of administrative tools for the implementation of state environmental policy</b></p> <p>Eco-management system in Ukraine. The main factors in the formation of the company's management culture. The purpose and principles of environmental licensing and certification. Opportunities for environmental insurance in Ukraine.</p>	1

	<p>Corporate culture. Literature: [1] pp. 110-157; 164-202; [2] c. 43-46</p>	
7	<p><b>Topic 7. Environmental audit</b> Drawing up an audit report. Certification of eco-auditors. Ecoaudit in the modern economy of Ukraine. Literature: [1] pp. 157-163; [2] c. 43-46</p>	1
8	<p><b>Topic 8. Legal liability for violation of environmental law.</b> Material liability for violation of environmental legislation. The concept and features of environmental and legal liability for violation of environmental legislation. The concept of economic and legal liability for environmental offenses Literature: [2] pp. 43-46; [4].</p>	1
<p><b>Section 4. Implementation of an ecosystem approach to sectoral policy and improvement of the integrated environmental management system</b></p>		
9	<p><b>Topic 9. Environmental management as a prerequisite for sustainable development</b> The right of general water use. The right of special water use. Control in the field of land use and protection. Literature: [1] pp. 32-33; [3].</p>	1
10	<p><b>Topic 10. Management in the field of protection of natural resource potential of Ukraine</b> Public administration in the field of formation, preservation and use of the ecological network of Ukraine Literature: [3].</p>	1
<p><b>Section 5. Economic mechanisms of environmental management</b></p>		
11	<p><b>Topic 11. Payment for natural resources and sources of their formation</b> Economic assessment of natural resources. Natural and cost characteristics of natural resource potential. Costly, effective cost-resource, market and rental approaches to the economic assessment of natural resources. Literature: [1] pp. 89-101.</p>	2
12	<p><b>Topic 12. Indetermining the amount of payment and collection of payments for environmental pollution in Ukraine</b> Legislative framework of environmental economics. Types of damage from environmental disturbances. Basic methods for quantifying economic damage. Financial mechanisms of environmental activities. Standards and fee system for environmental pollution. Get acquainted with the method of calculating 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 Literature: [1] c. 88-101.</p>	2
13	<p><b>Topic 13. Economic, environmental and social efficiency of environmental measures</b> Socio-ecological-economic strategies of Ukraine for harmonious development. Bilateral agreements and agreements of Ukraine in the field of environmental protection. Mechanisms for the implementation of environmental and economic goals (three approaches). The main reasons for the "failures" of the market in the environmental sphere. Literature: [1] p. 102-106.</p>	2
<p><b>Section 6. Basic principles of international experience in environmental safety management in the context of balanced development</b></p>		
14	<p><b>Topic 14. Improving the efficiency of public administration in Ukraine, taking into account international experience</b> European experience of public administration in the field of environmental protection.</p>	1

	<i>Literature: [1] pp. 23-32; [3] .</i>	
15	<b>Topic 15. Environmental education</b> <i>Environmental education in the process of professional development of specialists of the management level. Algorithm for environmental training of management personnel.</i> <i>Literature: [2] c. 43-46.</i>	<b>1</b>
16	<b>RGR</b>	<b>10</b>
17	<b>Preparation for MKR</b>	<b>4</b>
18	<b>Exam preparation</b>	<b>30</b>
	<b>Just</b>	<b>66</b>

## Policy and control

### 7. Policy of the discipline (educational component)

#### Rules for attending classes and behavior in the classroom

*Attendance is a mandatory component of the assessment. 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

- *Incentive points can be awarded by the teacher solely for performing creative work in the discipline or additional completion of online specialized courses with the receipt of the appropriate certificate:*
  - <https://www.coursera.org/learn/global-environmental-management>
  - <https://www.coursera.org/learn/circular-economy>
  - <https://www.coursera.org/learn/water-management>
  - <https://www.coursera.org/learn/environmental-management-ethics>
  - <https://www.coursera.org/learn/global-environmental-management>

*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 exam for another 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.	SRS	Fdm	RR	Semester control
7	4	120	36	18	–	66	1	1	Exam

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

The rating of a student from a credit module consists of points that he receives for:

1. speeches with a report on the topic, which are submitted for practical classes or for independent work;
2. active participation in the work of practical classes;
3. performing a modular test (divided into 2 tests of 45 minutes each);
4. performance of calculated work
5. answer on the exam.

### The system of rating (weight) points and evaluation criteria

1. Performing tasks in practical classes

Presentation

Weight score – 5. The maximum number of points in all practical classes is 5 points  $2 = \times 10$  points.

Criteria for evaluating the report:

The quality of the report and its protection	Points
The topic of the report is fully disclosed; the student thoroughly explains all aspects of the relevant topic, draws the necessary conclusions and generalizations, and clearly answers the questions posed	5
The report provides a sufficient number of facts and examples; no proper analysis or comparison has been made; answers to questions have some inaccuracies	4
The report does not provide enough facts and examples; no proper analysis has been carried out; insufficiently clearly formulated conclusions; the answers to the questions are fuzzy or have some inaccuracies	3
The topic of the report is not sufficiently disclosed; there are no conclusions; there are no answers to individual questions.	2
The report does not correspond to the formulated topic; most of the questions asked went unanswered	1
Report not prepared	0

Participation in the discussion of issues submitted to the practical lesson

Weight score – 1, the maximum number of points in all practical classes is 9 practical classes  $\times 1$  point = 9 points.

2. Execution of calculation tasks

The maximum number of points for completing the calculation task is 11 points.

The quality of the report and its protection	Points
Methods and results of calculations are correct	10... 11
Some inaccuracies and technical errors in the calculations have been made	8... 9
Inaccuracies and numerous errors in the calculations	4 – 7
The method of calculations is violated, only basic calculations have been made, the	1 – 3

<i>result has significant inaccuracies</i>	
<i>Task not completed</i>	<i>0</i>

### 3. Modulartest work:

The test is divided into 2 tests, each of which consists of 2 questions. Depending on the completeness and content of the answer to theoretical questions, the student receives from 0 to 5 points. 5 points  $\times 2 \times 2 = 20$  points.

Criteria for evaluating test questions:

<i>Completeness and signs of response</i>	<i>Points</i>
<i>Full answer to the question</i>	<i>5</i>
<i>A fairly complete answer with minor inaccuracies</i>	<i>4</i>
<i>The answer does not provide a sufficient number of facts, examples and conclusions, or some inaccuracies are made</i>	<i>3</i>
<i>This partial answer, or serious mistakes made</i>	<i>2</i>
<i>The answer is superficial; there is no specific wording of laws and terms</i>	<i>1</i>
<i>"Unsatisfactory": The answer is not credited or absent</i>	<i>0</i>

Thus, the maximum amount of points of the starting component from the credit module is:

$$R_c = 5 \cdot 2 + 9 + 11 + 5 \cdot 2 \cdot 2 = 50 \text{ points}$$

The examination component is 50% of R:

$$R_e = 50$$

The rating scale is:

$$R = R_c + R_e = 50 + 50 = 100 \text{ points}$$

According to the results of educational work for the first 7 weeks, the "ideal student" must score 13 points.

According to the results of educational work for 13 weeks of study, the "ideal student" must score 30 points.

A necessary condition for admission to the exam is the enrollment of all practical classes, the implementation of the MKR at the level of the starting rating, which is at least 30 points.

At the exam, students answer 4 questions of the exam ticket. Questions are estimated at 12.5 points.

Criteria for evaluating exam paper questions:

<i>Completeness and signs of response</i>	<i>Points</i>
<i>Full answer to the question (more than 90% of the necessary information)</i>	<i>11– 12,5</i>
<i>A fairly complete answer with minor inaccuracies (more than 75% of the necessary information)</i>	<i>8– 10</i>
<i>The answer does not provide a sufficient number of facts, examples and conclusions, or some inaccuracies are made (more than 60% of the necessary information)</i>	<i>5– 7</i>
<i>The answer is incomplete, facts and examples are not given (less than 60% of the required information)</i>	<i>1– 4</i>
<i>Answer not credited or missing</i>	<i>0</i>

The sum of the starting points received during the semester and the examination of all points is transferred according to the table:

<i>Score</i>	<i>Score</i>
<i>95... 100</i>	<i>Perfectly</i>
<i>85... 94</i>	<i>very good</i>
<i>75...84</i>	<i>well</i>
<i>65... 74</i>	<i>Satisfactory</i>
<i>60...64</i>	<i>enough</i>

<i>RD 60&lt;</i>	<i>Disappointing</i>
<i>Conditions of admission have not been met</i>	<i>not allowed</i>

## **9. Additional information on the discipline (educational component)**

### **An approximate list of questions that are submitted for semester control**

1. *Determine the place of environmental management in the system of other sciences. Give a modern conceptual approach to environmental management.*
2. *What principles is the management of environmental protection based on?*
3. *Identify the historical aspects of the development of environmental legislation of Ukraine. Analyze the international experience of environmental legislation.*
4. *Analyze and name the legislative acts that form the system of environmental legislation in the field of environmental protection.*
5. *Describe the basic regulatory principles set forth in the Declaration adopted at the UN World Conference on Environment and Development (Rio de Janeiro, 1992). Formulate recommendations for the implementation of the principles of balanced development.*
6. *Describe the basic requirements for environmental management. Analyze what problems need to be overcome at this stage for the effective functioning of environmental management.*
7. *Give a classification of departments according to systemic signs. Offer a fundamental model of the environmental management system.*
8. *Determine the purpose of state environmental management. Explain why management is targeted. Identify the main directions of state environmental management.*
9. *Determine the legislative framework of the target areas of management. Compare general and special management, determine their main functions.*
10. *Describe the subjects carrying out macro- and microecological management. Compare their authority in making management decisions.*
11. *List the existing levels of environmental management, reflecting the administrative-territorial structure of the state. Describe industry management. Explain the interaction of territorial and sectoral management on the example of a separate enterprise.*
12. *Describe the functions of general public administration.*
13. *Identify the bodies of special public administration. Identify and compare the target functions that they perform.*
14. *Identify the prerequisites and benefits of implementing a corporate environmental management system. Analyze the basic principles of creating a corporate environmental management system.*
15. *Describe environmental impact assessment as one of the effective mechanisms of the state environmental management system.*
16. *Describe the world practice of environmental certification. Justify the modern process of formation and implementation of environmental certification in Ukraine.*
17. *Cite the principles of the effective functioning of environmental certification. Justify the differences that exist between compulsory and voluntary certification. Identify the objects of mandatory environmental certification in the state system.*
18. *Justify the differences between environmental rationing and limiting. Describe the main indicators used to assess the anthropogenic impact.*
19. *Describe the development of environmental standardization in Ukraine. Describe international, state, industry and local standards. These are the main disadvantages of environmental rationing at the present stage of its development.*
20. *Give the basic principles of the state policy of Ukraine in the field of licensing. Justify licensing as an effective toolkit for environmental management.*
21. *Compare the strategic directions of environmental licensing: separate and comprehensive. Give the main stages of environmental licensing.*



22. Describe the development, formation and legislative design of the Environmental Impact Assessment in Ukraine.
23. Describe the composition, content and procedure for developing materials of the Environmental Impact Assessment.
24. Describe the powers of state bodies in the field of environmental monitoring. Cite the types and functions of environmental monitoring.
25. Identify the main grounds for the development of an environmental passport. Give the structure of the environmental passport of the enterprise.
26. Describe the main stages, goals and objectives of assessing the product life cycle. Offer a product life cycle diagram.
27. Compare the three types of eco-labeling. Determine the role of international standards in the field of environmental labeling. Give a matrix of criteria for ecological purity.
28. Describe the structure of a typical audit process of an environmental management system.
29. Describe the requirements for the audit plan and its structure. Compare responsibilities and voluntary audit.
30. Describe the process of ecological modernization of production. Compare the main types of wear: physical, functional, technological (moral), cost, environmental, managerial.
31. Determine how environmental marketing and engineering affect the efficiency of the corporation's investment activities.
32. Conduct a comparative analysis of direct and indirect participants in the lease agreement. Determine the benefits of the lessor and lessee.
33. Describe environmental insurance as an important lever for economic stimulation of environmental measures.
34. Give a description of the methods for determining the economic losses from environmental pollution.
35. Explain how to conduct a valuation of natural losses.
36. Describe the main functions of economic damage.
37. Give the main methods for determining economic losses.
38. Explain the definition of payments for emissions of pollutants into the atmosphere.
39. Describe the economic, environmental and social effects of environmental activities.
40. Public administration in the field of health as a social phenomenon
41. Comparative analysis of health policy of the World Health Organization, the Countries of the European Union and Ukraine.
42. The main directions of implementation of public administration for health care in Ukraine.
43. Basic principles of public administration in the field of health care.

**Pfish list of questions submitted for modular control work**

1. Describe the mechanisms of environmental management.
2. Describe on what principles environmental management is based.
3. Briefly describe the requirements for the effective functioning of environmental management.
4. Cite the basic regulatory principles for the harmonization of the coexistence of humanity and nature, which are set out in the Declaration adopted at the UN World Conference on Environment and Development (Rio de Janeiro, 1992).
5. Give a classification of departments according to systemic signs, briefly describe them.
6. Depict a fundamental model of the environmental management system.
7. Uncover the biotic mechanism of environmental management.
8. Give a brief description of the ecological and economic balance of the territories.
9. Describe the system of inventories of natural resources.
10. Explain the essence of the theoretical and methodological foundations of environmental management.
11. Explain the difference between "hard" and "soft" approaches in environmental management.
12. Describe the system-forming international principles of prevention, culprit and cooperation .

13. Explain the process of continuous improvement of the environmental management system.
14. Define the state system of environmental management. Explain what the main task of management is.
15. List the target functions of state environmental management.
16. Describe the special functions of state environmental management.
17. Name the bodies of general public administration and determine the powers vested in them.
18. Describe the system of indicators that determines the anthropogenic impact of pollutants on the environment.
19. Explain what principles and methodology underlie environmental impact assessment.
20. Explain what mandatory and voluntary certification is.
21. Give the structure of the environmental passport of the enterprise.
22. Cite legislative acts that define the functions of local environmental management.
23. Describe the program of conducting an environmental audit.
24. Explain the place of the corporate environmental management system in the overall national environmental management system.
25. Name the goals and features of the implementation of assessments of the characteristics of environmental friendliness and product life cycle.
26. Describe the goals and features of environmental certification and labeling.
27. Explain what are the principles of greening the production system.
28. Explain how environmental marketing and engineering affect the efficiency of a corporation's investment activities.
29. Cite legislative acts that define the functions of local environmental management.
30. What are the forms of public participation in environmental protection?
31. Explain how the economic losses from environmental pollution are determined.
32. Define actual, possible, and averted losses.
33. Describe the categories of payments for environmental pollution.
34. Provide a scheme for calculating payments for emissions of pollutants into the atmosphere by mobile sources of pollution.
35. Compare the schemes for calculating payments for emissions of pollutants into the atmosphere by stationary and mobile sources of pollution.
36. Explain how payments for discharges of pollutants into surface waters, territorial and inland seawater, and underground horizons are determined.
37. Explain how to determine the amount of payments for the disposal of waste in the environment.
38. Explain what is the overall environmental effect of environmental measures.
39. Describe the socio-economic result of environmental measures.
40. Compare the actual and expected net economic effect. Explain how they are defined.
41. Define the concept of overall economic efficiency. Explain the difference between the concepts of "effect" and "efficiency".
42. Explain what characterizes the indicator of comparative economic efficiency of environmental costs.
43. Describe the system of incentive measures in the environmental protection system.

### SET OF TASKS FOR THE RGR

The purpose of the calculation and graph work is to consolidate and deepen the knowledge gained during lectures and in practical classes related to the study of aspects of managing the implementation of environmental projects in order to increase the efficiency of environmental activities.

Settlement and graphic work is carried out on the basis of the individual task for the student.

The RGR is drawn up in the form of a settlement and explanatory note of 12–17 pages, which provides: tasks for calculation; strength; introduction; calculated part; conclusions; lists of literary references; applications (if necessary).

Task. Calculate the economic efficiency of the ecological project of re-profiling (modernization) of one of the workshops of the enterprise (industrial or municipal) for the production of construction materials, fuel composition with the extraction of metals, using some industrial and municipal solid waste. The cost of waste (raw materials for processing) is 40 UAH/t. Variants of output data to the calculation and graphic work for calculating the economic efficiency of the project and its indicators are given in the table.

Variant	Number of wastes, t/day	Cost of equipment, thousand UAH		
		liquidated	Used	installed
1	49	150.8	454.5	910.1
2	53	189.8	577.3	867.2
3	35	190.5	473.4	814.5
4	53	183.4	603.1	975.3
5	51	163.8	501.5	819.6
6	30	195.9	505.7	991.9
7	36	136.3	532.6	852
8	41	119.7	585.2	847.1
9	37	188.6	437.1	887.7
10	34	124.1	411.7	902.8
11	46	115.6	537.6	904.2
12	36	103.8	469.3	839.9
13	46	140.7	501.8	949
14	43	165.6	402.9	982.8
15	34	145.1	477.1	894.5
16	44	147.2	474.9	930.5
17	33	195.1	548.4	822.9
18	36	163.2	570.1	868.6
19	48	166.6	579.6	970.4
20	40	118.4	416.8	931.7
21	48	109.4	533.5	914.8
22	43	105.3	593.9	908.3
23	54	162.3	441.8	958.3
24	42	137.5	554.2	883.8
25	45	142.2	502.5	945.6
26	43	167.2	454.9	930.7
27	39	185.1	538.4	842.9
28	37	163.2	550.1	868.6
29	43	136.6	559.8	960.7
30	49	118.4	426.8	941.7
31	47	129.4	543.3	917.4
32	42	108.3	573.9	938.3
33	55	172.3	545.8	968.5
34	46	167.5	564.1	983.9
35	45	128.2	522.5	955.5

***The work program of the discipline (syllabus):***

***Compiled by*** Assoc. Prof., Ph.D., Trus I.M.

***Approved by department E and TRP (protocol № 14 from 08.06.2022. )***

***Approved by the Methodical Commission of the Faculty (Protocol № 10 dated 24.06.2022. )***