MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMICS

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PROGRAM
OF DISCIPLINE
"ECOLOGY"
for students of all areas of training
full-time

Program developers: **Ph.D. ass. Prof. Mikhailova Eugene A.**
Ph.D. ass. Prof. Popenko Galina S.
Ph.D. ass. Prof. Ivashura Andrey A.
D. Sci. , Prof. Skorodumova Olga. B.

Responsible for release
Head. Dep. Logvinkov SM

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1. INTRODUCTION

At the turn of the second and third millennia of human existence environment and its components is becoming increasingly important for economic development, health, durability and quality of life. Further sustainable development is only possible on condition that rationalization of nature conservation and effective mechanisms to optimize the interaction between society and the environment. Of particular importance is the activation of applying economic methods to prevent and eliminate pollution and damage to the environment.

Nowadays, the environment is for all mankind not only science, but also a means of thinking, behavior, real action, to some extent even worldview. No exaggeration to say that the environment has become one of the sides of humanism, including a spirituality, understanding of the unity of man and nature, high culture, intelligence.

At this stage it is imperative to take account of the fact that the rational use of natural resources and environmental improvement of the environment as a whole - compliance with environmental interests, environmental orientation form the basis of any human activities.

To make the most effective decisions specialists from various economic disciplines need to know and understand the mechanisms of interaction in the system "society - environment - Technosphere", be aware of the legal and technological components of environmental problems.

The purpose of this training is discipline is to develop students' competencies on issues of modern ecology, understanding the mechanism of influence of human activity on the environment, analysis of the main sources of impact on the environment and the primary requirements for storage, lay the foundations of future specialists in environmental culture. To achieve the goal the following ***tasks:***

give students a modern, very in-depth knowledge about the ecological knowledge as a necessary mechanism for harmonizing relations in the system "society - environment - Technosphere";

justify the need for greening as a professional activity and human life, practical means and mechanisms of this process to achieve sustainable development in Ukraine;

apply ecological knowledge to optimize ecological and economic relations in the professional sphere.

The object of the course is patterns and interaction in the system "society - environment - Technosphere" to greening human activity.

The subject of the course are basic concepts, laws, methods and forms of interaction between society and the environment in the course of human activities, economic as well as life, the impact of this activity on the state of the environment, methods of environmental protection and environmental management.

Prerequisites: this is the initial training course and provides the following courses: "Microeconomics", "Macroeconomics", "Political economy", "Regional Economy", "Sociology".

Following the completion of the course the student should:

to know:

object, subject and methods of modern ecology;

basic terms, concepts and theoretical principles of modern ecology;

general regularities of development and cooperation system "man - society - biota - environment";

basic forms and peculiarities of human actions on the environment;

natural-scientific and economic basis for environmental management;

economic bases of environmental protection from pollution;

the main regulations and laws of Ukraine in the field of environment and natural resources;

basic methods of quality management of the environment and environmental management;

effective economic mechanism of nature.

to be able:

apply basic ecological knowledge to assess the environmental and economic situation of the region of the country;

efficient use of environmental directories, laws and regulations on environmental protection;

formulate practical proposals to improve the state of the environment and rationalization of nature;

assess the economic damage from environmental pollution and unsustainable use of natural resources;

determine the best ways to manage the quality of the environment;

evaluate the effectiveness of the use of natural resources at the

enterprise;

analyze compliance with standards for the use of resources;

evaluate the performance of the enterprise in the field of environmental protection and environmental management;

use modern methods of solving environmental and economic problems and environmental management;

plan and develop economically reasonable measures to protect the environment and natural resources;

assess the environmental security.

In the process of teaching focuses on student mastery of professional competence, which is shown in the Table. 1.1.

The structure of the components of professional competence and their formation according to the National Qualifications Framework Ukraine are given in Table 1. 2.

Table 1.1

Professional competence is derived after studying students discipline

Name competence	The components of competence
Predict, plan and implement measures to improve the effectiveness of the company and any financial institution in the field of environmental protection and environmental management.	To ground and correlate environmental and economic priorities in the professional sphere
	Grounded analyze the impact of environmental and ecological problems in certain activities
	Evaluate the performance of the enterprise in the field of environmental protection and environmental management
	Formulate practical proposals to improve the state of the environment and rationalization of nature in the enterprise
	To determine the best ways to manage environmental quality
	Prioritize environmental requirements to the profession and apply them
	Apply legal principles of nature protection and environmental management, and methods of using environmental information
	To control the level of impact on the environment
	Evaluate the effectiveness of the use of natural resources in the enterprise
	plan and develop economically reasonable measures to protect the environment and natural resources
	assess the environmental security company

Table 1.2

The structure of the components of the professional competences of the educational discipline "Ecology" according to the National Qualifications Framework of Ukraine

Elements of competence, is formed within threads	Minimum experience	Knowledge	Competence	Communications	Autonomy and responsibility
1	2	3	4	5	6
Theme 1. The method, heart of the problem and ecology problems					
Understanding the importance of environmental awareness and the need for practical activity in the economy	In-depth knowledge about the ecological knowledge as a necessary mechanism for harmonizing relations in the system "society - environment - Technosphere"	Knowledge of object, subject and methods, basic terms, concepts in theoretical propositions of modern ecology	Ability to reasonable comparison of the environmental and economic priorities in the economy	Receive, analyze and disseminate information among experts concerning environmental conditions and environmental consequences of certain professional activities	The ability to receive, analyze and use environmental information in the development and management of innovative projects with a high level of responsibility
Theme 2. Ecosystem level of organization of matter					
Understanding the importance of the environment for economic activity of the person	Patterns of relationships between living organisms themselves and the environment	Knowledge of different types of ecosystems and their properties	Ability to evaluate the advantages and disadvantages of considering certain environmental requirements	Getting basic knowledge for the assessment of innovative and practical activities regarding ecology	Responsibility for decision-making during environmental measures

1	2	3	4	5	6
Theme 3. Biosphere is a global ecosystem of Earth. Global environmental problems					
Understanding the role and impact of human activity on the state of the biosphere and the reverse process	Patterns of development, operation and forecasting future state of the biosphere	The concept of the structure and function of the biosphere, ways to maintain balance in the biosphere	Ability to reasoned analysis of the impact of environmental and ecological problems in certain activities	The ability to effectively manage environmental information relating to certain professional activities	Applying the knowledge gained in the field of ecology and environmental management for solving problems by various levels of complexity and responsibility for working conditions in a group of experts
Theme 4. Anthropogenic influence on the environment					
Definition of environmental standards and requirements to human activities	The capacity for assessment and classification of data on the impact of professional activities on the environment and vice versa	The concept of the polluting factors and the maximum allowable level of human impact on the environment	The ability to analyze compliance with environmental standards of practice	Effectively generate communication strategy in certain professional activities	Make effective management decisions and take responsibility for the accuracy and reliability of results in the implementation of environmental measures in certain professional activities
Theme 5. Economic mechanisms of Environment Protection and Natural Resources					
Awareness of the need of environmental management	Understanding the methods of environmental management and natural resources	Knowledge about measures to protect the environment and assessing their environmental and economic efficiency	Ability to prioritize environmental requirements to the profession	The ability to search for solutions to complex practical problems in the professional field related to certain environmental problems	The ability to form groups of professionals to solve complex tasks taking into account environmental effects

Continuation of Table 1.2

1	2	3	4	5	6
Theme 6. Environmental monitoring of the environment. Legal regulation of environmental relations in Ukraine					
The definition of legal principles and methods to obtain and use environmental information	The ability to provide and justify management decisions based on monitoring data	Knowledge of data classification and evaluation of environmental monitoring and their use in the profession	The ability to receive, analyze and evaluate the environmental monitoring data and use them for some practice	The ability to form a communication strategy on the legal principles of ecological relations Ukraine	Educate subordinates take into account the environmental costs and problems in solving complex professional problems and develop innovative projects
Theme 7. Environmental Management and Marketing					
The ability to assess and analyze the effectiveness of environmental measures and the efficient use of natural resources	The principles of implementation of environmental management and control in the enterprise	Knowledge of functions and methods of environmental management; the general principles of the economic mechanism of environmental management	Evaluate the performance of the enterprise in the field of environmental protection and environmental management	Identify environmental problems in the professional sphere, their causes and finding their solutions	Responsibility for planning of environmental services for the enterprise
Theme 8. Environmental safety and environmental risks					
The ability to assess the environmental safety of certain professional activities	The norms, ways and rules of environmental hazards; legal, economic and technical and technological mechanisms to ensure environmental safety	Knowledge about environmental safety based on a clear understanding of the patterns of environmental hazards and safety management	Conduct analysis of environmental hazardous situations, to determine the degree of risk and develop measures to prevent them	To form a decision and to develop measures to manage environmental safety of different levels	The development of specific measures for ecological safety management

End table 1.2

1	2	3	4	5	6
Theme 9. World environmental policy. International integration of environment					
Understanding the basic principles and goals of international cooperation in the field of ecology	Forms and principles of international cooperation, international organizations, programs and projects in the field of ecology	Knowledge of goals and objectives, ways and means to implement environmental policy; stages of international cooperation in the field of environmental protection	Understanding the mechanisms of mutual planetary environment, the global economy and world politics	Navigate in global economic, environmental, demographic, migration processes	Responsibility for accurate identification of the key environmental problems in international politics

To study of the course is given 150 hours (5 ECTS credits). Form of final control - test.

2. The program of the course

Content Module 1. Ecosystem level of organization of matter and the anthropogenic impact on the environment

Theme 1. The method, heart of the problem and ecology problems

1.1 Ecology as a science, its structure and role in society today. The concept of ecology, its subject, object and purpose.

1.2 Historical development of relations between man and nature.

1.3 The main problem of ecology.

Theme 2. Ecosystem level of organization of matter

2.1. The natural environment and ecological factors.

The concept of the environment. Definition and types of environment.

Environmental factorst: concept and classification. General laws and their effect on living organisms. Limiting factors.

2.2. Populations.

The concept of population. Statistical and dynamic factors of populations. Dynamics of population size.

2.3. Ecosystems.

The concept of ecosystems, ecosystem classification. Energy and principles of functioning ecosystems. Acceptable performance and stability of ecosystems. Development of ecosystems: succession.

The concept of environmental components. The main environmental components of ecosystems: the energy, the atmosphere, water, soil, information, biota. Description of each of these environmental components. Environmental Pyramid.

Homeostasis. Homeostasis as the equilibrium of natural systems. Food Chain and its variants. Food Network.

2.4. The laws of ecology.

The main environmental laws. Meaning laws Vernadsky, Komoner and Chyras for environmental management.

3. The biosphere is global ecosystem of Earth. Global enviromental problems

3.1. Biosphere.

The terms "biosphere" and "living matter." Vernadsky doctrine of the biosphere and the noosphere. The limits of the biosphere. Biosphere as one of the layers of the Earth. The atmosphere, lithosphere, hydrosphere as part of the biosphere.

3.2. General properties of the biosphere.

Circulation of matter and energy in the biosphere. Place of ecosystems in the organization of the biosphere. Biogenic chemical elements. Biogeochemical cycles.

Small biological cycle and large geological one of matter. Water cycle, nitrogen, carbon dioxide and sulfur cycle, phosphorus, carbon as the most vital substances biosphere.

Dynamics and evolution of the biosphere.

3.3. Global environmental problems.

Global environmental problems. The demographic problem. Contamination of the environment. The problem of modern climate change. United Nations Framework Convention on Climate Change. Depletion of the ozone layer in the stratosphere. Tropospheric ozone. Acidification of the environment. Acid rains. The problem of attitude and waste production. The problems of radioactive pollution.

Theme 4. The anthropogenic impact on the environment

4.1. Contamination of the environment.

Sources, types and extent of pollution. The behavior of pollutants in the environment. The most common pollutants. The phenomenon of synergy. The global nature of the impact of anthropogenic pollution on the biosphere and individual ecosystems.

Types of pollution and its impact on man and his activities.

Pollution of the atmosphere, hydrosphere and soils.

4.2. The influence of different branches of industry on the environment.

Mining. Chemical, petrochemical and refining industry. Ferrous and nonferrous metallurgy. Fuel and energy complex. Agriculture. Housing. Transport track facilities. Contamination of the environment objects.

Content Module 2. Environmental protection and environmental management

Theme 5. Economic mechanisms of environmental protection and environmental management

5.1. Natural resources.

Classification of natural resources. International natural resources. Resource loop circuit as anthropogenic substances. The principles of environmental management. Modern environmental requirements for the human activity.

5.2. Environmental management.

The concept of low- and non-waste technology. Classification of waste. Problems of waste management in various areas of human activity.

Basic principles of non-waste technology. Waste consumption.

5.3. Methods of environmental management.

The economic mechanism of environmental protection. Ecological and economic factors of evaluation of production processes. The effectiveness of measures to protect the operating system. Methodological approaches to determining the economic and social damage from pollution OS. Economic stimulation for environmental protection activities of subjects of enterprise activity.

Reconciliation and issuing licenses for nature management. Environmental funds. Environmental insurance.

Theme 6. Environmental monitoring of the environment. Quality control of the environment in Ukraine

6.1. Control and quality management of environment.

The concept of the effect of summation. Criteria for assessing the quality of the environment. Quality standard of environment.

6.2. Environmental monitoring.

The concept of ecological monitoring and its objectives. Classification of monitoring. Formation of databases for environmental monitoring. Complex monitoring of the biosphere. Providing monitoring.

Impact assessment of industrial facility on the environment. Environmental impact assessment of objects. Control of industrial emissions and other household objects.

6.3. Legislation in environmental protection.

The legal basis for the protection of air, water bodies, mineral resources. Legislation in protected activity.

Environmental Law. Concept, subject and sources of environmental law. Environmental offense. The legal regime of nature management and the OS protection. Types of liability for environmental offenses.

Theme 7. Environmental Management and Marketing

7.1. Environmental Management.

The concept, object and functions of environmental management. The mechanism formation of nature management in a market economy. Valuation biotic component of ecosystems.

Environmental management at enterprises.

7.2. Ecological marketing.

The essence, aims, methods and objects of environmental marketing.

7.3. Environmental audit.

Tasks, procedures, effectiveness of environmental audit.

Theme 8. Environmental safety and environmental risks

8.1. Ecological safety.

Basic concepts of environmental safety. The components of environmental safety. Types, sources and consequences of environmental hazards. The environmental crisis, ecological situation. Anthropogenic factors of adverse environmental situations. Environmental emergency. Regulation of environmental situations.

8.2. The environmental risk.

The concept of environmental risk. The danger and safety. "Acceptable" risk. Evaluation and principles of risk management.

Theme 9. World environmental policy. International integration of environment

9.1. International cooperation in the field of ecology.

"Programme of Action" of the UN Conference on Environment and Development in Rio de Janeiro in 1992. Kyoto Protocol on reducing greenhouse gas emissions. Stockholm Convention of organic contaminants.

The Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol reduction of ozone decomposing substances.

9.2. International environmental law.

3. Themes of practical employments

Workshop is a form of instruction in which the teacher organizes detailed examination of some theoretical positions and forms of discipline and skills of their practical application by individual student performance of various tasks. Conducting such studies based on pre-prepared teaching materials - tests to identify the necessary mastery of theoretical provisions set tasks of different difficulty levels for solving them in class. It includes preliminary control of knowledge, abilities and skills of students, setting the general problem of the teacher and her discussions with students, solving the problems and their discussion, solving control tasks, their verification testing (Table. 3.1).

Table. 3.1

The list of topics of practical lessons

Name module	Topics of practical classes (according to modules)
Content Module 1. Ecosystem level of organization of matter and the anthropogenic impact on the environment	*Task 1. Calculated methods of Environmental Assessment*
	Task 2. Integrated environmental-economic evaluation of environmental and resource management.
	Task 3. Evaluation of the effectiveness of water protection measures
	Task 4. Calculation of economic compromising enterprise from pollution emissions and waste of its production.
Content Module 2. Environmental protection and environmental management	*Task 5: Ecological and economic valuation of the environment and the effectiveness of environmental activities. Evaluation of social and economic damage from pollution.*
	Task 6. Determination of maximum permissible emissions (MPE) of harmful substances from specific sources.
	Task 7. Engineering evaluation of the environment on the method VG Hmoshynskoho
	Task 8. Methods for determination of environmental risk
	Task 9. Analysis of international treaties concerning resolve and settlement of global environmental problems.

4. Individual work

Independent work of students (IWS) is a form of educational process in which a student run scheduled tasks independently under the methodical guidance of teacher.

The main types of independent work, students proposed for mastering theoretical knowledge and forming practical skills of the course are listed in the Table. 4.1.

Table. 4.1.

Tasks for independent work of students and forms of control

topic	Content of independent work of students	Forms of IWS control
1	2	3
Content Module 1. Ecosystem level of organization of matter and the anthropogenic impact on the environment		
Theme 1. The method, heart of the problem and ecology problems	Study of lectures, preparation for practical classes "Calculated methods of Environmental Assessment"	Checking homework
Theme 2. Ecosystem level of organization of matter	Study of lectures, preparation for practical classes *«Integrated environmental-economic evaluation of environmental and resource management.*».	Checking homework
Theme 3. Biosphere is a global ecosystem of Earth. Global environmental problems	Study of lectures, preparation for practical classes «*Evaluation of the effectiveness of water protection measures*»	Checking homework
Theme 4. Anthropogenic influence on the environment	Study of lectures, preparation for practical classes «*Calculation of economic compromising enterprise from pollution emissions and waste of its production.*». Preparation for the control of 1.	Checking homework Test 1

End table 4.1

1	2	3
Content Module 2. Environmental protection and environmental management		
Theme 5. Economic mechanisms of Environment Protection and Natural Resources	Study of lectures, preparation for practical classes «*Ecological and economic valuation of the environment and the effectiveness of environmental activities. Evaluation of social and economic damage from pollution.*».	Checking homework
Theme 6. Environmental monitoring of the environment. Legal regulation of environmental relations in Ukraine	Study of lectures, preparation for practical classes *«Determination of maximum permissible emissions (MPE) of harmful substances from specific sources.***».**	Checking homework
Theme 7. Environmental Management and Marketing	Study of lectures, preparation for practical classes «*Engineering evaluation of the environment on the method VG Hmoshynskoho*»	Checking homework
Theme 8. Environmental safety and environmental risks	Study of lectures, preparation for practical classes *«Methods for determination of environmental risk*»	Checking homework
Theme 9. World environmental policy. International integration of environment	Study of lectures, preparation for practical classes *«Analysis of international treaties concerning resolve and settlement of global environmental problems» .* Preparation for the control of 2	Checking homework Test 2

5. Teaching methods

During the whole of teaching to enhance teaching and learning of students it is expected to use both active and interactive learning technology, including lectures problematic, mini-lectures, work in small groups, seminars, discussions, brainstorming, case-method presentations, trial (initial) games, method of project work, computer simulations, Delphi method, the method of scenarios, banks visual support (Table. 5.1 and 5.2).

Table. 5.1

Distribution of forms and methods to enhance the learning process on the topics of the course (lectures)

Theme	The practical application of educational technology
1	2
Theme 1. The method, heart of the problem and ecology problems	Mini lecture on "Ecology - the science or ideology?"
Theme 2. Ecosystem level of organization of matter	Problem lecture on "Biodiversity as a condition for the stability of any ecosystem"
Theme 3. Biosphere is a global ecosystem of Earth. Global environmental problems	Problem Lecture on "Conditions of stability and energy in ecosystems and the biosphere."
Theme 4. Anthropogenic influence on the environment	Mini lecture on "The economic importance of environmental quality for the person."
Theme 5. Economic mechanisms of Environment Protection and Natural Resources	Problem lecture on "Methods of economic incentives for environmental protection activities"
Theme 6. Environmental monitoring of the environment. Legal regulation of environmental relations in Ukraine	Mini lecture on "The degree of implementation of environmental legislation '
Theme 7. Environmental Management and Marketing	Problem lecture on "Organic products - a reality?".
Theme 8. Environmental safety and environmental risks	Mini lecture on "The increasing role of ecological security in society".
Theme 9. World environmental policy. International integration of environment	Mini lecture on "The advantages and disadvantages of the Kyoto Protocol on Ukraine"

Table. 5.2

Use of activation of the learning process (practical training)

Topic	Practical implementation techniques	Methods activation learning process
Theme 2. Ecosystem level of organization of matter	*Task 2. Integrated environmental-economic evaluation of environmental and resource management.*	Brainstorming on the analysis of the demographic problem in Ukraine
Theme 4. Anthropogenic influence on the environment	*Task 4. Calculation of economic compromising enterprise from pollution emissions and waste of its production.*	The management situation "Modern methods of waste disposal"
Theme 5. Economic mechanisms of Environment Protection and Natural Resources	*Task 5: Ecological and economic valuation of the environment and the effectiveness of environmental activities. Evaluation of social and economic damage from pollution.*	The seminar-discussion "The situation with natural resources in our country"
Theme 9. World environmental policy. International integration of environment	*Task 9. Analysis of international treaties concerning resolve and settlement of global environmental problems.*	Brainstorming about solutions to global environmental problems.

6. Recommended Books

6.1. Base books

1. Коваленко Г.Д. Основы экологии: учебн. пособ. / Г.Д. Коваленко, Г.С. Попенко. – Х.: ИД «ИНЖЭК», 2009. – 280 с.

2. Коваленко Г. Д. Основи екології. Навчальний посібник / Г. Д. Коваленко, Г. С. Попенко. – Харків: Вид. ХНЕУ, 2006. – 228 с.

3. Колесников С.И.Экологические основы природопользования. – М.: Дашков и К°, Академцентр, 2012. – 304 с.

4. Миркин Б.М. Краткий курс общей экологии. Ч. 1 и 2 / Б.М. Миркин, Л.Г. Наумова. – Уфа: БГПУ, 2011. Ч.1. – 206 с., Ч.2 – 180 с.