**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE**

**DEPARTMENT OF EDUCATION AND SCIENCE**

**of the Khmelnytskyi Regional State Administration**

**HIGHER PROFESSIONAL SCHOOL No. 36, S. BALYN**

**"I APPROVE"**

**Head's assistant**

**from educational and production work**

 **\_\_\_\_\_\_\_\_\_\_\_\_\_ Anatoly Chmyl**

**"\_\_\_" \_\_\_\_\_\_\_\_\_\_\_\_ 20**

### *WORKING CURRICULUM*

from the discipline: "Fundamentals of ecology"

for professional junior bachelors

specialty: 208 "Agroengineering"

the total number of hours according to the working curriculum 45 hours

 classroom classes from them: 30hours lectures at 10 p.m. seminary8 hours

 independent work 15hours

Teacher Larisa Blidna

The program was reviewed and approved interprofessionally

methodical committee of teachers and masters

industrial training of technical professions

Protocol No.\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The head of the inter-professional methodical commission

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(signature, surname , initials)

**The purpose and tasks of the educational discipline**

The Basics of Ecology program summarizes environmental education. The educational course is focused on the coverage of environmental problems related to changes and transformations of natural processes and components of nature.

The general goal of the course: the formation of the final elements of ecological culture, skills, fundamental ecological knowledge, ecological thinking and consciousness, based on a careful attitude to nature as a unique natural resource.

The main ideas of the program: highlighting the theoretical and methodological foundations, which are based on the basic principles of the international strategy of sustainable development and applied aspects of environmental research, familiarization with the main environmental problems in Ukraine and the world.

The main tasks of the "Fundamentals of Ecology" course are:

- formation of global knowledge about the main trends in the development of ecological features of nature use;

- disclosure of the scientific foundations of the study of environmental problems in accordance with the provisions of the international strategy of sustainable development;

- raising a sense of responsibility for the pollution of the natural environment, the state of the environment, awareness of the need to comply with environmental legislation;

- development of a system of intellectual and practical abilities and skills, in relation to the assessment of ecostates and ecosituations, the degree of their tension, the effectiveness of nature protection.

The volume of environmental material obtained by students as a result of successful assimilation of the course "Fundamentals of Ecology" should formulate in each of them a personal relationship to the environmental problems of the world, their native region, the field of future activity, help take into account environmental requirements and standards when solving engineering and other tasks, ensure a stock of fundamental knowledge and conceptual foundations of modern ecology, sufficient for further deepening and improvement of environmental education, aimed at ecologically safe life.

 The structure and content of the "Fundamentals of Ecology" program are based on the principles of continuity and continuity of environmental education, its integration into the foundations andintra-subject and inter-subject connections, humanization, environmentalization, differentiation of educational material depending on the practical orientation. The content of the "Ecology" course is built on the basis of modern ideas about the essence, structure, goals and objectives of ecology, its importance in society, place and connection with other sciences.

The course "Fundamentals of Ecology" includes information on fundamental theoretical, global ecological and resource-industry environmental problems, strategy, tactics and methods of solving them at the local, national and global level.

The cross-cutting content lines specified in the Concept of Environmental Education of Ukraine were reflected in the program.

This course is designed for 45 hours (30 hours - classroom classes, 15 hours - independent work).

The practical part of the program is an important and mandatory component of it, since substantiation of certain dependencies, proof of existing development trends, and ultimately argumentation of a specific position is impossible without providing certain statistical information. Therefore, practical work involves solving simple environmental problems, carrying out comparative analysis, conducting observations, mini-research, discussions, seminars, "round tables", business games, monitoring studies, writing creative works.

When evaluating the educational achievements of students in ecology, it is necessary to be guided by the criteria approved by the Ministry of Education and Science of Ukraine, taking into account:

- correctness and scientific presentation of the material, completeness of disclosure of concepts and regularities, accuracy of use of ecological terminology;

– the degree of independence of the answer;

– logicality and evidence in the presentation of the material;

– degree of development of intellectual, general education, specific skills (work with cartographic, statistical and other additional materials).

The system of acquired knowledge should ensure the formation of clear and well-founded ideas about the interaction and relationship of all components in the natural, social and technological spheres, about the strategy and tactics of the preservation and stable development of life on Earth.

Current and final controls have been introduced to ensure the constant character of knowledge acquisition.

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**Program**

**from the discipline: "Fundamentals of ecology"**

**specialty: 208 "Agroengineering"**

**Topic 1. Introduction. Theoretical aspects of general ecology**

**Topic 1.1. Ecology – the theoretical basis of rational nature management.**

Ecology is the theoretical basis of rational nature management. The evolution of the relationship between man and the natural environment. The state of the environment in Ukraine. Agricultural production as an important branch of reproduction and use of natural resources, the need to improve its efficiency. The role and main tasks of an agricultural specialist in the protection and rational use of natural resources in the process of professional activity.

**Topic 1.2 The biosphere and human transformative activity**. Ecology is the theoretical basis of rational nature management. Definition, subject, tasks and significance of ecology.

Historical sketch of the emergence, formation and development of ecology as a science. Current state, structure of ecology, its connection with other disciplines. Ecology and agriculture. The biosphere and human transformative activity.

General properties of the biosphere. The role of V.I. Vernadskyi in the study of the biosphere. Composition and functioning of the biosphere. Global processes in the biosphere (biological, geological). Cycle of carbon, water, oxygen, nitrogen, phosphorus, sulfur. Energy transformation in the biosphere. Productivity of the biosphere.

Anthropogenic impact on the biosphere on biocenoses. The influence of the anthropogenic factor on the circulation of substances and energy in the biosphere. Noosphere. Renewable and non-renewable resources of the biosphere and their use

**Topic 1.3 Organization and functioning of ecological systems**

Environmental factors and organisms. Conditions of existence of organisms. Concept of environment. The impact of industrial activity on the natural environment. Population, biocenosis, ecosystem. Population as a form of existence of a species. Number, population density. Population structure. Biocenosis, ecosystem, biogeocenosis. Interactions in ecological systems. Structures of biocenoses (spatial, species, trophic). Ecosystem productivity and production. Successions. Types of artificial biocenoses. Impoverishment and relative instability of artificial biocenoses. Ways of maintaining balance. Agroecosystems (agrobiocenoses) and their characteristics. Types of agrobiocenoses. The structure of agrobiocenosis. Species relationships in agrobiogeocenosis. Dynamics of agrobiocenoses.

Possibilities of managing the productivity of agrobiogeocenoses by methods of selection, hybridization, optimization of environmental factors.

**Topic 2. Practical aspects of ecology**

**Topic 2.1 Modern ecological problems of nature protection in agricultural production**

Global ecological problems of nature protection, their characteristics.

Earth's population and related problems. The problem of raw resources.

Energy problems. Food problems. Ways and prospects of solving raw material energy and food problems.

Pollution of the natural environment as an ecological problem. Types of pollution. The main possibilities of sources of pollution in the field of agricultural production. Mineral fertilizers, pesticides, livestock waste.

The impact of agricultural machinery on the environment and soil properties.

Measures to prevent the consequences of environmental pollution in agriculture

**Topic 2.2Protection of atmospheric air**

The meaning of atmosphere. Sources and types of atmospheric pollution. Natural pollution. Anthropogenic factors of atmospheric pollution. Road transport - pollution of the atmosphere. Industrial, radioactive, noise, electromagnetic pollution of the atmosphere. Climatic aspect of atmospheric pollution. Harmful effect of polluted air on people, animals, and plants. The state of the air environment in Ukraine. Measures to combat air pollution. MPC of pollutants in the atmospheric air of populated areas. Legal protection of the atmosphere. Law of Ukraine "On Protection of Atmospheric Air"

**Topic 2.3 Protection and rational use of water resources**

Water resources of the planet, their supply and distribution.

Water resources of the planet, their supply and distribution. Water resources of Ukraine, region. Problems from growing water consumption. Increase in water consumption by industry, for domestic needs and in agriculture.

Sources and types of water pollution. Pollution of internal water bodies and groundwater, radioactive water pollution. Ecological state of water bodies of Ukraine.

Practice session. Hygienic requirements for the composition and properties of water.

Measures to reduce the degree of water pollution. Standards of MPC and water quality control.

**Topic 2.4 Protection of the lithosphere**

Soil is the main means of production in agriculture. Soil protection against depletion. Soil erosion and damage caused by it. Soil protection from water erosion. Soil protection against wind erosion. Pollution and clogging of soils. Land reclamation and its environmental consequences.

The current state of the soils of Ukraine and ways to improve it. Control and management of soil quality. Protection and rational use of the earth's subsoil. Reclamation of land disturbance. Legal protection of lands. Land Code of Ukraine. Fundamentals of legislation on subsoil. Code of Ukraine on subsoil.

**Topic 2.5 Protection of flora and fauna**

Plant life protection. The importance of plants in human life. Plant resources of Ukraine, regions. A brief overview of forest resources. Problems of rational use of forest resources and their protection.

Protection of the animal world. The importance of animals in human life. Causes of animal extinction. Rare and endangered fauna species of Ukraine.

Practice session. Acquaintance with the Red Book, rare species of plants and animals listed in it.

Independent work. Legal protection of flora and fauna. Fish resources of Ukraine and their protection. Legal protection and fauna. Forest Code of Ukraine. Law of Ukraine "On the Animal World"

**Topic 3. Organizational and economic aspects of rational nature management**

**Topic 3.1Organization of agricultural production in radioactively contaminated territories.**

Agricultural radioecology.

Sources of radioactive contamination of environmental objects and agricultural production

Natural and artificial sources of radionuclides. Natural sources. Sources of artificial radionuclides. Accident at the Chernobyl Nuclear Power Plant.

Independent work

Migration of radionuclides in the environment and objects of agricultural production. Entry of radionuclides into agricultural plants. Forecasting the entry of radionuclides into the animal body.

Basic principles of organizing agriculture in radionuclide-contaminated territories.Means of reducing the intake of radionuclides in agricultural plants and in the body of farm animals.

Radiometric and dosimetric devices and measurements.

Practice session. Familiarization with the structure and principle of operation of radiometric and dosimetric control devices.

**Topic 3.2Environment and public health.**

The quality of the natural environment and people's health. Diseases associated with environmental pollution. Environmentally safe food products. Rational nutrition. Water quality and people's health. Radiation and health. Methods of removing substances from the human body.

**Topic 3.3 Basics of the economy of nature use.**

Greening of the economy, environmental monitoring and its types. The concept of "environmental safety of the enterprise". Energy saving measures.

Independent work. Protected objects of our region

**Topic 3.4**Organization and strategic systems of rational nature management

Waste-free technologies.

Independent work. Strategic system of rational nature management

The program was reviewed and approved interprofessionally

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(signature, surname , initials)

**THEMATIC PLAN**

|  |  |  |
| --- | --- | --- |
| No | Name of the section, module, topic of the program | Amount of hours |
| According to the curriculum |
| In total | Of them |
| Auditory | Theoretical | Practical | The selfthem |
| 1 | 2 | 3 |  | 4 | 5 |  |
| 1 | **Theoretical aspects of general ecology** | **8** | **6** | **6** |  | **2** |
| 1.1 | Ecology is the theoretical basis of rational nature management | 2 | 2 | 2 |  |  |
| 1.2 | The biosphere and human transformative activity | 2 | 2 | 2 |  |  |
| 1.3 | Organization and functioning of ecological systems | 4 | 2 | 2 |  | 2 |
| 2 | **Practical aspects of ecology** | **22** | **12** | **8** | **4** | **8** |
| 2.1 | Modern ecological problems of nature protection in agricultural production | 4 | 2 | 2 |  | 2 |
| 2.2 | Protection of atmospheric air | 2 |  |  |  | 2 |
| 2.3 | Protection and rational use of water resources | 6 | 4 | 2 | 2 | 2 |
| 2.4 | Protection of the lithosphere | 2 | 2 | 2 |  |  |
| 2.5 | Protection of flora and fauna | 6 | 4 | 2 | 2 | 2 |
| 3 | **Organizational and economic aspects of rational nature management** | **15** | **12** | **10** | **2** | **5** |
| 3.1 | Organization of agricultural production in radioactively contaminated territories | 5 | 6 | 4 | 2 | 1 |
| 3.2 | Environment and public health | 2 | 2 | 2 |  |  |
| 3.3 | Basics of environmental economics | 4 | 2 | 2 |  | 2 |
| 3.4 | Organization and strategic systems of rational nature management | 4 | 2 | 2 |  | 2 |
|  | **Together** | **45** | **30** | **22** | **8** | **15** |

**Contents of the work program**

**from the discipline: "Fundamentals of ecology"**

**specialty: 208 "Agroengineering"**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **lesson no** | **Name of the section, module, topic of the program****The topic of the lesson and its summary** | **Number of hours** | **Forms and methods of teaching** | **Educational and methodical literature and visualization** | **Independent work of students** | **Forms of current control** |
| **In total** | **Of them:** |
| **auditorium** | **theoretical** | **practical** | **independent** |
| 1 | 2 | 3 | 4 |  | 5 |  | 6 | 7 | 8 | 9 |
| **1** | **Theoretical aspects of general ecology** | **8** | **6** |  | **6** | **2** |  |  |   |  |
| 1.1 | Ecology is the theoretical basis of rational nature management | 2 | 2 | 2 |  |  |  |  |  |  |
| 1 |  The evolution of the relationship between man and the natural environment. The state of the environment in Ukraine. Agricultural production as an important branch of reproduction and use of natural resources, the need to improve its efficiency. The role and main tasks of an agricultural specialist in the protection and rational use of natural resources in the process of professional activity. | 1 | 1 | 1 |  |  | Lecture | Anishchenko V.O. p.6-7 Potish A.A. with. 9-10 |  |  |
| 1.2 | The biosphere and human transformative activity | 2 | 2 | 2 |  |  |   |  |  |  |
| 2 | Ecology is the theoretical basis of rational nature management.Definition, subject, tasks and significance of ecology.Historical sketch of the emergence, formation and development of ecology as a science. Current state, structure of ecology, its connection with other disciplines. Ecology and agriculture. | 1 | 1 | 1 |  |  | Combined lesson | Anishchenko V.O. p.8-12 Potish A.A. with. 9-14 |  | independent work |
| 3 | The biosphere and human transformative activity.General properties of the biosphere. The role of V.I. Vernadskyi in the study of the biosphere. Composition and functioning of the biosphere. Global processes in the biosphere (biological, geological). Cycle of carbon, water, oxygen, nitrogen, phosphorus, sulfur. Energy transformation in the biosphere. Productivity of the biosphere. | 1 | 1 | 1 |  |  | Lecture | Lukyanova L.B. with. 180-188 |  | poll |
| 4 | Anthropogenic impact on the biosphere on biocenoses. The influence of the anthropogenic factor on the circulation of substances and energy in the biosphere. Noosphere. Renewable and non-renewable resources of the biosphere and their use. | 1 | 1 | 1 |  |  | Combined lesson | Lukyanova L.B. The basics of ecology 78-84 |  | testing |
| 1.3 | Organization and functioning of ecological systems | 4 | 2 | 2 |  |  |  |  |  |  |
| 5 | Environmental factors and organisms.Conditions of existence of organisms. Concept of environment. The impact of industrial activity on the natural environment. | 1 | 1 | 1 |  |  | Combined lesson | Anishchenko V.O. p.33-36 Potish A.A. with. 42-65 |  |  |
| 6 | Population, biocenosis, ecosystem. Population as a form of existence of a species. Number, population density. Structure of populations. Biocenosis, ecosystem, biogeocenosis. Interactions in ecological systems. Structures of biocenoses (spatial, species, trophic). Productivity and products of the ecosystem. Successions. Types of artificial biocenoses. Impoverishment and relative instability of artificial biocenoses. Ways of maintaining balance. Agroecosystems (agrobiocenoses) and their characteristics. Types of agrobiocenoses. The structure of agrobiocenosis. Species relationships in agrobiogeocenosis. Dynamics of agrobiocenoses. | 1 | 1 | 1 |  |  | Lecture | Lukyanova L.B. Principles of Ecologywith. 51-78 |  | poll |
|  | **Independent work**Possibilities of managing the productivity of agrobiogeocenoses by methods of selection, hybridization, optimization of environmental factors. | 2 |  |  |  | 2 | Lecture |  |  | performing exercises |
| **2.** | **Practical aspects of ecology** | **22** | **12** | **8** | **4** | **8** |  |  |  |  |
| 2.1 | Modern ecological problems of nature protection in agricultural production | 4 | 2 | 2 |  | 2 |  |  |  |  |
| 7 | Global ecological problems of nature protection, their characteristics.Earth's population and related problems. The problem of raw resources.Energy problems. Food problems. Ways and prospects of solving raw material energy and food problems. | 1 | 1 | 1 |  |  | Combined lesson | Lukyanova L.B. Principles of Ecologywith. 87-90 |  | testing |
| 8 | Pollution of the natural environment as an ecological problem. Types of pollution. The main possibilities of sources of pollution in the field of agricultural production.Mineral fertilizers, pesticides, livestock waste. | 1 | 1 | 1 |  |  | Lecture | Make a presentation |  |  |
|  | **Independent work**The impact of agricultural machinery on the environment and soil properties.Measures to prevent the consequences of environmental pollution in agriculture | 2 |  |  |  | 2 | Independent work |  |  |  |
| 2.2 | Protection of atmospheric air**Independent work**The meaning of atmosphere. Sources and types of atmospheric pollution. Natural pollution. Anthropogenic factors of atmospheric pollution. Road transport - pollution of the atmosphere. Industrial, radioactive, noise, electromagnetic pollution of the atmosphere. Climatic aspect of atmospheric pollution. Harmful effect of polluted air on people, animals, and plants. The state of the air environment in Ukraine. Measures to combat air pollution. MPC of pollutants in the atmospheric air of populated areas. Legal protection of the atmosphere. Law of Ukraine "On Protection of Atmospheric Air" | 2 |  |  |  | 2 |  |  |  |  |
| 2.3 | Protection and rational use of water resources | 6 | 4 | 2 | 2 | 2 |  |  |  |  |
| 9 | Water resources of the planet, their supply and distribution.Water resources of the planet, their supply and distribution. Water resources of Ukraine, region. Problems from growing water consumption. Increase in water consumption by industry, for domestic needs and in agriculture. |  |  |  |  |  | Combined | Anishchenko V.O. with. 63-70 Lukyanova L.B. with. 122-126 | Work with literature | pollTesting |
| 10 | Sources and types of water pollution. Sources of types of water pollution. Pollution of internal water bodies and groundwater, radioactive water pollution. Ecological state of water bodies of Ukraine. |  |  |  |  |  | lecture | Anishchenko V.O. with. 70-73 Lukyanova L.B. with. 130-143 |  | Independent work |
| 11 | Practice session. Hygienic requirements for the composition and properties of water. |  |  |  | 1 |  |  |  |  |   |
| 12 | Practice session. Hygienic requirements for the composition and properties of water. |  |  |  | 1 |  |  |  |  | Protection of practical work |
|  | **Independent work.**Measures to reduce the degree of water pollution. Standards of MPC and water quality control. |  |  |  |  | 2 |  |  |  |  |
| 2.4 | Protection of the lithosphere | 2 | 2 | 2 |  |  |  |  |  |  |
| 13 | Soil is the main means of production in agriculture.Soil is the main means of production in agriculture. Soil protection against depletion. Soil erosion and damage caused by it. Soil protection from water erosion. Soil protection against wind erosion. Pollution and clogging of soils. Land reclamation and its environmental consequences. | 1 | 1 | 1 |  |  | Seminar class | Lukyanova L.B. with. 148-151, p. 156-161 |  | Testing |
| 14 | The current state of the soils of Ukraine and ways to improve it.The current state of the soils of Ukraine and ways to improve it. Control and management of soil quality. Protection and rational use of the earth's subsoil. Reclamation of land disturbance. Legal protection of lands. Land Code of Ukraine. Fundamentals of legislation on subsoil. Code of Ukraine on subsoil. | 1 | 1 | 1 |  |  | Seminar class |  |  | Independent work |
| 2.5 | Protection of flora and fauna | 6 | 4 | 2 | 2 | 2 |  |  |  |  |
| 15 | Protection of plant lifeThe importance of plants in human life. Plant resources of Ukraine, regions. A brief overview of forest resources. Problems of rational use of forest resources and their protection. | 1 | 1 | 1 |  |  | Lecture | Lukyanova L.B. with. 180-188 |  | Poll |
| 16 | Protection of the animal worldThe importance of animals in human life. Causes of animal extinction. Rare and endangered fauna species of Ukraine. Protection of the animal world. | 1 | 1 | 1 |  |  | Combined | Lukyanova L.B. pp. 193-199; 200-217 |  | PollTesting |
| 17 | Practice session. Acquaintance with the Red Book, rare species of plants and animals listed in it. |  |  | 1 |  |  | Practice session | Acquaintance with rare species of the Red BookAnishchenko V.O. with. 188-193; p. 193-199; Lukyanova L.B. pp. 192-215; |  |   |
| 18 | Practice session. Acquaintance with the Red Book, rare species of plants and animals listed in it. |  |  | 1 |  |  | Practice session |  |  | Independent work |
|  | **Independent work**Legal protection of flora and fauna. Fish resources of Ukraine and their protection. Legal protection and fauna. Forest Code of Ukraine. Law of Ukraine "On the Animal World" |  |  |  |  |  | Independent workIndividual classes | Lukyanova L.B. with. 217-220<https://zakon.rada.gov.ua/laws/show/3852-12#Text> |  |  |
| 3 | Organizational and economic aspects of rational nature management | 12 | 10 | 2 | 5 |  |  |  |  |  |
| 3.1 | Organization of agricultural production in radioactively contaminated territories | 12 | 6 | 4 | 2 | 1 |  |  |  |  |
| 19 | Agricultural radioecology.Agricultural radioecology.Sources of radioactive contamination of environmental objects and agricultural production | 1 | 1 | 1 |  |  | Lecture | <https://naurok.com.ua/prezentaciya-na-temu-silskogospodarska-radioekologiya-197189.html> |  | Poll |
| 20 | Natural and artificial sources of radionuclides.Natural sources. Sources of artificial radionuclides. Accident at the Chernobyl Nuclear Power Plant | 1 | 1 | 1 |  |  |  | <https://ecologyknu.wixsite.com/ecologymanual/kopiya-13-8> |  |  |
|  | **Independent work**Migration of radionuclides in the environment and objects of agricultural production.Migration of radionuclides in the environment and objects of agricultural production. Entry of radionuclides into agricultural plants. Forecasting the entry of radionuclides into the animal body. | 1 |  |  |  | 1 |  |  |  |  |
| 21 | Basic principles of organizing agriculture in radionuclide-contaminated territories. | 1 | 1 | 1 |  |  | Combined | <https://inis.iaea.org/collection/NCLCollectionStore/_Public/53/004/53004840.pdf> |  | Poll |
| 22 | Means of reducing the intake of radionuclides in agricultural plants and in the body of farm animals.Means of reducing the intake of radionuclides in agricultural plants and in the body of farm animals.Radiometric and dosimetric devices and measurements. |  |  |  |  |  |  | [https://ep3.nuwm.edu.ua/18527/1/Radioekologiya.pdf](https://ep3.nuwm.edu.ua/18527/1/%D0%A0%D0%B0%D0%B4%D1%96%D0%BE%D0%B5%D0%BA%D0%BE%D0%BB%D0%BE%D0%B3%D1%96%D1%8F.pdf) |  |  |
| 23 | Practice session. Familiarization with the structure and principle of operation of radiometric and dosimetric control devices |  |  |  | 1 |  |  | <https://vseosvita.ua/library/embed/002rad-0e86.docx.html> |  |  |
| 24 | Practice session. Familiarization with the structure and principle of operation of radiometric and dosimetric control devices |  |  |  | 1 |  |   |  |  | Tests |
| 3.2 | Environment and public health | 2 | 2 | 2 |  |  |  |  |  |  |
| 25 | The quality of the natural environment and people's health.The quality of the natural environment and people's health.Diseases associated with environmental pollution. Environmentally safe food products. Rational nutrition. | 1 | 1 | 1 |  |  |   | <https://naurok.com.ua/prezentaciya-na-temu-vpliv-navkolishnogo-seredovischa-na-zdorov-ya-lyudini-239886.html> |  | Poll |
| 26 | Water quality and people's health.Water quality and people's health.Radiation and health. Methods of removing substances from the human body. | 1 | 1 | 1 |  |  |   | <https://raygorod-otg.gov.ua/news/1654777969/> |  |  |
| 3.3 | Basics of environmental economics | 4 | 2 | 2 |  | 2 |  |  |  |  |
| 27 | Greening of the economy, environmental monitoring and its types. | 1 | 1 | 1 |  |  | Seminar class | <https://buklib.net/books/24813/> |  | Independent work |
| 28 | The concept of "environmental safety of the enterprise". Energy saving measures. | 1 | 1 | 1 |  |  |  |  |  |  |
|  | **Independent work**Protected objects of our region | 2 |  |  |  | 2 |  |  |  |  |
| 3.4 | Organization and strategic systems of rational nature management | 4 | 2 | 2 |  | 2 |  |  |  |  |
| 29 | Waste-free technologies | 1 | 1 | 1 |  |  |  | <https://buklib.net/books/28212/> |  |  |
| 30 | Test | 1 | 1 | 1 |  |  |  |  |  |  |
|  | **Independent work**Strategic system of rational nature management | 2 |  |  |  | 2 |  |  |  |  |

**Letter - approval of the working study program with other disciplines of the specialty**

|  |  |
| --- | --- |
| Subject of disciplines | Discipline, section, topic with which the teaching of the subject is connected |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|  | Ukr..m. by professional direction | Economy | Agronomy | Agricultural machinery  |  |  |
|

|  |
| --- |
| 1 Theoretical aspects of general ecology |
| 1.1 Ecology is the theoretical basis of rational nature management |  |
| 1.2 The biosphere and human transformative activity |
| 1.3 Organization and functioning of ecological systems |
| 2 Practical aspects of ecology |
|  |
| 2.1 Modern ecological problems of nature protection in agricultural production |
| 2.2 Protection of atmospheric air |
| 2.3 Protection and rational use of water resources |
|  |
| 2.4 Protection of the lithosphere |
| 2.5 Protection of flora and fauna |
| 3 Organizational and economic aspects of rational nature management |
| 3.1 Organization of agricultural production in radioactively contaminated territories |
| 3.2 Environment and public health |
| 3.3 Basics of environmental economics |
| 3.4 Organization and strategic systems of rational nature management |

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|  |  |  |  |  |  |

Last name of the teacher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Individual tasks**

|  |  |  |
| --- | --- | --- |
| Topics | Type of task (abstracts, presentations, etc.) | Calendar termsForm of control |
| 1. Historical outline of the emergence, formation and development of ecology as a science. | abstract |  |
| 2. Ecological research in Ukraine. | abstract |  |
| 3. Influence of abiotic factors on human health. | abstract |  |
| 4. Influence of biotic factors on human health. | presentation |  |
| 5. Influence of anthropogenic factors on human health. | abstract |  |
| 6. Biosphere. Teachings of V.I. Vernadsky about living matter. | abstract |  |
| 7. Origin and evolution of the biosphere. | abstract |  |
| 8. The role of man in the biosphere. | presentation |  |
| 9. Environmental problems of the world: causes and factors of their occurrence. | AbstractVideo clip |  |
| The main environmental problems of the world | abstract |  |
| 10. Natural ecological disasters. | abstract |  |
| 11. Anthropogenic ecological disasters. | abstract |  |
| 12. Accident at the Chornobyl NPP. | abstractpresentation |  |
| 13. Protection of animal and plant life. Protected business. | abstract |  |
| 14. Red Book - World and Ukrainian. | AbstractPresentationVideo clip |  |
| 15. Environmental problems and ways to solve them in the field of energy. | abstract |  |
| 16. Ecological problems and ways to solve them in the field of agriculture and forestry. Alternative agriculture. | abstract |  |
| 17. Environmental problems and ways to solve them in industry. The problem of waste disposal in Zaporizhzhia. | abstract |  |
| 18. Environmental problems and ways to solve them in the field of transport. | abstract |  |
| 19. Environmental problems and ways to solve them in the field of public utilities. | abstractpresentation |  |
| 20. Environmental problems and ways to solve them in the field of military affairs. 21. Ecological problems and ways to solve them in the field of science. Development of new biotechnologies. | abstract |  |
| 22. Alternative sources of energy and their impact on the environment (energy of the wind, seas and oceans, internal heat of the Earth, the Sun) | abstract |  |
| 23. Ecology of cities. | abstract |  |
| 24. Fundamentals of radioecology. The impact of radiation on the environment. | abstract |  |
| 25. Ecology and space. | abstract |  |
| 26. Ecological problems of the largest rivers, the Black and Azov seas. | abstractpresentation |  |
| 27. Characteristics of environmental conditionsDonetsk-Dnipro region. | abstract |  |
| 28. Environmental problemsUkrainian Polissia and the Carpathians. | abstract |  |
| 29. Environmental problems of Zaporozhye. | abstract |  |
| 30. Consequences of the accident at the Chernobyl nuclear power plant. Ways out of the environmental crisis. | abstractpresentation |  |
| 31. Ukraine's participation in international environmental protection activities. | abstract |  |
| 32. Ways to solve environmental problems of mankind. | abstract |  |
| 33. The problem of the future of the "society-nature" system in theories of social development. | abstract |  |
| 34. Environmental law. Laws, normative acts of Ukraine on environmental protection. (Excerpt from the Constitution of Ukraine "On Environmental Protection". Excerpt from the Law of Ukraine "On Environmental Protection"). | abstractpresentation |  |
| 35. Main international and national state and public environmental organizations, movements. | abstract |  |
| 36. The main directions of the state policy of Ukraine in the field of environmental protection, use of natural resources and ensuring environmental safety. | abstract |  |
| 37.Ecological movement of Ukraine. | abstract |  |
| 38. Ukraine's participation in international environmental protection activities. | abstract |  |

**Summary data**

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| --- | --- | --- | --- | --- |
| **Course** | **5** | **5** |  | **Hours in general** |
| semester | **1** |  |  |  |
| Total hours per discipline | **45** |  |  | **45** |
| Including classrooms: | **30** |  |  | **30** |
| Lectures, seminar classes | **22** |  |  | **22** |
| practical | **8** |  |  | **8** |
|   |  |  |  |  |
| Other types of classes: |  |  |  |  |
| independent work |  |  |  | **15** |
| consultations |  |  |  |  |
| individual tasks |  |  |  | **Abstract****Presentation****Video clip** |
| Forms of final control |  |  |  | **Test** |

**Teaching methods**

- verbal, visual, practical;

- analytical, synthetic, inductive, deductive;

- reproductive, problem-searching, creative;

- interactive;

- methods of independent work and work under the guidance of a teacher;

- methods of students' independent cognitive activity (observation, research, work with visualization).

**Control methods**

* oral control and self-control (individual survey, frontal survey, oral knowledge test...);
* written control and self-control (control written works, written credits, program control, written self-control.

**Methodical support**

1. Political map of the world
2. Physical world map of Ukraine
3. Workbook for practical works.
4. Tables on ecology.Didactic materials.
5. Multimedia presentations on topics.

**Basic literature**

* 1. Bilyavskyi G.O., Furduy R.S., Kostikov I.Yu. Basics of ecology: Textbook. - K.: Lybid, 2004 - 408p.
	2. Ecology: Subd. For 11cl. worldwide establishments Standard level, Acad. level./L.P. Tsaryk, P.L. Tsaryk, I.M. Vitenko-2nd ed.-K.: Geneza, 2012.
	3. Ecology: Subd. For 10cl. worldwide establishments Standard level, Acad. level./L.P. Tsaryk, P.L. Tsaryk, I.M. Vitenko-K.: Geneza, 2011.
	4. Curly V.P. Ecology. - Lviv: Svit, 2001-50p.

5. Saltovskyi O.I., Basics of social ecology: Study guide.-Kyiv: Center of educational literature, 2004.-382p.

1. Tsaryk T. E., Faifura V. V. Fundamentals of ecology. – Ternopil, 2003. – 208 p.

7. Ecology. 11th grade: workbook (standard level, academic level) / R. M. Shalamova - Kharchenko, O. M. Borozdina. - Kh.: Ranok Publishing House, 2016. - 48 p. + Appendix 32 p.

**Additional literature**

1. Balandyn R.K., Bondarev L.T. Nature and civilization. - M.: Mysl, 1988. - 391 p.
2. Bilyavskyi G.O., Butchenko L.I., Navrotskyi V.M. Fundamentals of ecology: theory and practice. Tutorial. - K.: Libra, 2002. - 352 p.
3. Brovdiy V. M., Gatsa O. O. Ecological problems of Ukraine (problems of noogenics). - K.: NPU, 2000. - 110 p.
4. Heinrich D., Gergt M. Ecology: dtv-Atlas: Trans. with him - K.: Znannia-Press, 2001. - 287 p.
5. Ecology of the city / Ed. Stolberga F.V.: Textbook. - K.: Libra, 2000. - 464 p.
6. Zapolsky A. K., Salyuk A. I. Basics of ecology: Textbook / Ed. K. M. Sytnyk. - K.: Vyshcha Shk., 2004. - 382 p.
7. Zlobin Yu. A., Kochubey N. V. General ecology: Education. manual. - Sumy: VTD "University Book", 2003. - 416 p.
8. Yu. O. Kutlahmedov, etc. Fundamentals of radioecology: Teaching. manual / Edited by V. P. Zotova. - K.: Vyshcha Shk., 2003. - 319 p.
9. Malyshko M. I. Environmental law of Ukraine: Education. manual. - K.: VD "Legal Book", 2001. - 392 p.
10. Musienko M. M., Serebryakov V. V., Brion O. V. Ecology. Nature protection: Dictionary-reference. - K.: T-vo "Znannia", KOO, 2002. - 550 p.
11. Reimers N.F. Natural resources: Dictionary-reference. - M.: Mysl, 1990. - 637p.
12. Sukharev S. M., Chudak S. Yu., Sukhareva O. Yu. Technoecology and environmental protection. Education manual. – Lviv: Novy svit–2000, 2004. – 256 p.
13. Red Book of Ukraine. They are waiting for our help / Editors O. Yu. Shaparenko, S. O. Shaparenko. - Kh.: Torsing, 2002. - 336 p.
14. Economic analysis of the impact on the environment /D. Dixon et al. Trans. with English - M.: VITA-PRESS, 2000. - 270 p.

**Documents:**

1.Environmental legislation of Ukraine: Coll. Norm. Acts / Rep. ed. I. O. Zayets. - K.: Yurinkom Inter, 2001. - 416 p.

2. Constitution of Ukraine.

3. Law of Ukraine "On Environmental Protection".

4. Program of actions. Agenda for the 21st century and other documents of the conference in Rio de Janeiro in a popular presentation. - Geneva, 1992

**Internet resources**

1. BF "Ekopravo-Lviv" [Electronic resource]. – Access mode: http://www.ecopravo.lviv.ua.

2. Web catalog on the environment. – Access mode: http://www.webdirectory.com/.

3. Web page of the Environmental Program of the European Commission. – Access mode: http://www.europa.eu.int/comm/dgs/environment/index en.htm.

4. All-Russian ecological server. – Access mode: http://www. ecology.ru/.

5. Global resource information database [Electronic resource]. – Access mode: http://www.grida.no.

6. Eco-bulletin / REC-KYIV [Electronic resource]. – Access mode: http://www.rec-kyiv.org.ua.

7. Ecological economics [Electronic resource]. – Mode of access: http://csf.colorado.edu/ecol-econ/.

8. Ecological pages of Ukraine [Electronic resource]. – Access mode: http://www.nature.org.ua.

9. Ecological and cultural center "Bakhmat". - Access mode: http://www.bakhmat.org.

10. Magazine "Green Energy" [Electronic resource]. – Access mode: http://www.ri.Lviv.ua.

11. Means of searching for information about the environment. – Access mode: http://www.isleuth.com/envi.html.

12. Information and environmental portal Inform-Ekologiya. – Access mode: http://www.informeco.ru.

13. Information on ecology [Electronic resource]. - Access mode :<http://www.emfund.com.ua>.

14. Catalog of sites about natural resources and ecology. – Access mode: http://www.list.priroda.ru.

15. Catalog of Ukrainian Web-resources on ecology. – Access mode: http://catalog.uintei.kiev.ua/index.php.

16. Collection of links to environmental sites. – Access mode: http://www.ceroi.net/index.htm.

17. International social movement "Human Ecology". – Access mode: http://www.ecochel.msk.ru.

18. The Ministry of Ukraine for Emergency Situations and the Protection of the Population from the Consequences of the Chernobyl Disaster. State Department - Administration of Exclusion Zones and Mandatory Resettlement Zones. – Access mode: http://www.ic-chernobyl.kiev.ua.

19. Association Bellona. – Access mode: http://www.bellona.no/r/. 63. Open reference and information system ECOLINE. – Access mode: http://www.cci.glasnet.ru/main/index.htm.

20. Official website of the Ministry of Ecology and Natural Resources of Ukraine. – Access mode: http://www.menr.gov.ua.

**ADDITIONS AND CHANGES TO THE WORKING PROGRAM OF THE DISCIPLINE**

**for the 20\_\_\_/20\_\_\_ academic year**

|  |  |  |
| --- | --- | --- |
| No | Topic name | Contents of additions and changes |
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Considered and approved at the meetinginterprofessional

methodical committee of teachers and masters

technical industrial trainingdiscipline

Protocol №\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Head of Commission \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (signature) (surname and initials)

**I APPROVE**

Deputy director for educational and production work\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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