

**НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І
ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ**

Кафедра екології агросфери та екологічного контролю

«ЗАТВЕРДЖУЮ»
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біотехнологій та екології
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«СХВАЛЕНО»
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«РОЗГЛЯНУТО»
Гарант ОП 101 «Екологія»
В.М. Боголюбов

РОБОЧА ПРОГРАМА НАВЧАЛЬНОЇ ДИСЦИПЛІНИ
“Агроєкологія” («Agroecology»)
(шифр і назва навчальної дисципліни)

Спеціальність: **101 «ЕКОЛОГІЯ»**

Освітній ступінь: **«Бакалавр»**

Освітня програма: **«Екологія»**
(назва ОП)

Факультет: **захисту рослин, біотехнологій та екології**
(назва)

Розробник: **Вагалюк Л.В., к.с.-г. н., доцент**

(посада, науковий ступінь, вчене звання)

Київ – 2023 рік

1. Description of the discipline

“Agroecology”

Field of knowledge, specialty, educational program, educational degree		
Educational degree	Bachelor	
Specialty	101”Ecology”	
Educational program	Ecology	
Characteristics of the discipline		
Kind of the discipline	Obligatory	
Total number of hours	150	
Credit amount ECTS	5	
Number of content modules	2	
Course project (work) for availability)	-	
Form of control	Exam	
Indicators of academic discipline for full-time and part-time forms of education		
	Full-time	Part-time
Year of preparation (course)	3	
Semester	6	
Lectures	30	
Practical, seminar classes	30	
Laboratory classes	-	
Individual work	90	
Number of weekly classrooms hours for full-time study	4	

2. The purpose and objectives of the discipline

“Agroecology” involves various approaches to solve actual challenges of agricultural production. Though agroecology initially dealt primarily with crop production and protection aspects, in recent decades new dimensions such as environmental, social, economic, ethical and development issues are becoming relevant. Today, the term “agroecology” means either a scientific discipline, agricultural practice, or political or social movement. Here we study the different meanings of agroecology. It **aims** to increase the interaction between plants, animals, and the environment for food security and nutrition.

Learning objectives are aspects are studying belongs acquaintance with the harmful action of pesticides, contamination of environment, as result of mineral fertilizers application, and agricultural produce – by nitrates. The special attention is devoted the degradation processes of soils: humus damages, wind and water erosion, updepressed. Topics are also consider in relation to the alternative ways of support of agriculture, bringing of organic fertilizers and biological protection of plants, soil protection cultivation till and general ecological situation, in agrolandscapes and main tasks of “Agroecology” studies.

Learning outcome of course is the student's ability as a specialist:

- Gain a wider understanding of agroecological and environmental issues ranging from biodiversity to climate resilience and appreciate potential approaches for cities to deal with ecological and environmental challenges and threats of climate change.
- Enhance abilities and skills relating to evaluation of environmental and social impacts of urban development.

Upon completion of this course, students should be known:

- criteria for selection and formation of research topics;
- basic principles of organization and conduct of scientific research;
- methods of mathematical processing of research results;
- methodology of ecological research;
- organization and conduct of expeditionary research;
- methods of laboratory, field, vegetation and lysimetric research;
- technique of work with experimental objects;
- methods of plant and soil diagnostics, environmental monitoring, land certification;
- basic principles of analysis, generalization and interpretation of results scientific research;
- requirements for writing, design and defense of diploma, master's degree works;
- requirements for the preparation of publications, reports.

should be able:

- formulate basic environmental laws, rules and principles of environmental protection and balanced nature management.
- understand basic concepts, theoretical and practical problems in the field of natural sciences that are necessary for analysis and decision-making in the field of ecology, protection environment and sustainable use of nature.
- apply management principles on which based environmental safety system.
- know the conceptual foundations of monitoring and normalization of anthropogenic load on the environment.
- identify the factors that determine the formation landscape and biological diversity.

Acquisition of competencies:

Integral competence (IC): The ability to generate new ideas, solve complex problems in the field of ecology, environmental protection and sustainable use of natural resources in the implementation of research and innovation activities.

General competencies (GC):

GC1 Knowledge and understanding of the subject area and professional activities.

Special (professional) competencies (SC)

SC1. Knowledge and understanding of the theoretical foundations of ecology, environmental protection and sustainable use of natural resources.

SC2. Ability to critically comprehend the basic theories, methods and principles of the natural sciences.

SC4. Knowledge of current achievements of national and international environmental legislation.

SC10. Ability to use modern information resources and technologies for environmental research.

SC12. Ability to master international and domestic experience in solving regional and

transboundary environmental problems.

SC15. Ability to develop an algorithm for achieving the indicators of the goals of the Water Strategy of Ukraine, taking into account the peculiarities of the territory

SC18. Ability to assess the impact of military operations on environmental components and justify measures to restore them.

Program learning outcomes (PLO)

PLO2. Formulate the basic environmental laws, rules and principles of environmental protection and sustainable use of natural resources.

PLO3. Understand the basic concepts, theoretical and practical problems in the field of natural sciences necessary for analysis and decision-making in the field of ecology, environmental protection and sustainable use of natural resources.

PLO5. To know the conceptual foundations of environmental monitoring and regulation of anthropogenic pressure on the environment.

PLO7. Solve problems in the field of environmental protection using innovative approaches, national and international experience.

PLO10. To be able to apply software and hardware, GIS technologies and Internet resources for information support of environmental research, in particular, in radioactively contaminated areas.

PLO11. To be able to predict the impact of technological processes and production on the environment.

PLO13. To be able to formulate effective communication strategies to convey ideas, problems, solutions and own experience in the field of environmental, biological and radiation safety.

OOI22. Participate in the development of projects and practical recommendations for environmental protection with the involvement of the public.

PLO24. Understand and exercise their rights and responsibilities as a member of society, the rule of law, human and civil rights and freedoms in Ukraine, use different types and forms of physical activity to lead a healthy lifestyle.

PLO25. To preserve and enhance the achievements and values of society based on an understanding of the place of the subject area in the general system of knowledge.

PLO26. To be able to develop technologies that guarantee the protection, balanced use of natural resources of the agrosphere and the quality of agricultural products.

1. Program and structure of the discipline

Program and structure of the discipline

Names of content modules and topics	Number of hours									
	full-time					part-time				
	total	including				total	including			
		l.	p.	lab.	ind.		l.	p.	lab.	ind.
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>
Module 1. Bases of ecology and agroecology										
Lecture 1. Introduction. A subject of agroecology, its modes,	13	2	2	-	9	11	2	-	2	7

functions and tasks										
Lecture 2. Biodiversity levels of organization	13	2	2	-	9	9		-	2	7
Lecture 3. Natural and artificial biocenoses. Biocenoses - examples	15	3	3	-	9	10	2	-	2	6
Lecture 4. Threats to biodiversity	17	4	4	-	9	10	2	-	2	6
Lecture 5. Conservation biodiversity	17	4	4	-	9	6		-		6
Total for the module 1	75	15	15	-	45	46	6	-	8	32
Module 2. Anthropogenic impact on agroecosystems										
Lecture 1. Biodiversity	13	2	2	-	9	11	2	-	2	7
Lecture 2. Crops and Their Environment	13	2	2	-	9	9		-	2	7
Lecture 3. Management of unwanted organisms	15	3	3	-	9	7				7
Lecture 4. Ecological succession	17	4	4	-	9	7				7
Lecture 5. Agroecological aspects of global change	17	4	4	-	9	6				6
Total for the module 2	75	15	15	-	45	40		-	4	32
Total	150	30	30	-	90	86	8	-	12	66

4. Practical topics

№	Name of theme	Hours
1	Analysis of features of historical stages of the interaction of society and nature	2
2	Types of nutrition and types of relationships in agrobiocenosis	2
3	Ecological factors and their interaction in agrobiocenosis	4
4.	Analysis of schemes of circulation of basic substances in nature for the change of their links by anthropogenic activity	4
5.	The existing and optimal structure of nature management in Ukraine	3
6.	Analysis of the peculiarities of the development of the protected area network of Ukraine	2
7.	Assessment of chemical pollution of soils in settlements	2
8.	Assessment of the state of aquatic environments	4
9.	Research of successional changes in the agrobiocenosis	4

10	Determination of the level of food pollution by nitrates	3
	Total	30

5. SELF-TRAINING THEMES

№	Name of theme	Hours
1	Influence of anthropogenic factors on human health.	10
2	Characteristics of social ecological movements.	10
3	Ecology of the living environment.	10
4	Anthropogenic transformation of the nature of the Kherson region.	10
5	The ecological aspect of military conflicts. The ecological danger of military actions.	10
6	Influence of the Chernobyl catastrophe, consequences of the accident.	10
7	Causes of growth and ways out of the ecological crisis.	10
8	Protected natural areas	10
9	International environmental organizations. Problems of relationship between man and nature.	10
Total		90

6. Topics of laboratory classes

№	Name topics	Number hours
1	Not provided for in the curriculum	
2		
...		

7. Individual work

Individual work of students is a necessary element of learning material. Students are offered the following types of independent work:

1. Study of lecture material.
2. Elaboration of recommended literature and search for additional literature.
3. Assimilation of basic terms and concepts on the topics of the module.
4. Preparation for seminars and discussions.
5. Preparation of essays on the recommended topic. The list of topics is given below.

The topic for the preparation of essays in academic disciplines, the student chooses independently or on the recommendation of the teacher.

The essay should consist of the following sections:

- introduction - the topic, purpose and tasks of the work and its main provisions are indicated;
- volume - 1 - 2 paragraphs;
- literary review - the student must set out the main provisions of the essay, given in recent literary publications;
- volume - 1 page;
- main results of work - in this section statistical or qualitative results of work, schemes, drawings, models, systematized abstract information, certain analysis of achievements, etc. ;
- volume - 2 - 3 pages;

- conclusions and recommendations - the results of the analysis of the research on the topic of essays should be presented; suggestions and recommendations received in the essay, conclusions on the practical use of the results are presented;
- list of used literature - all used literary sources should be given. The list is compiled in a certain order (laws of Ukraine, decrees of the President, resolutions of the Verkhovna Rada and the Cabinet of Ministers, statistical directories, general and special literature in alphabetical order). Data on the sources listed must be provided in accordance with the requirements of the state standard. The student must use the literary sources of the last years of publication (not older than 5 years). Depending on the topic of the essay, the list of literature sources must contain at least 5 references. Scientific articles and monographs should be the highest priority literary sources. The use of sources from the Internet is allowed, but only the official websites of state or public institutions, official electronic publications.

The volume of the essay should be 5 - 6 pages in print.

The essay should be designed according to the normative rules of text design, tables, formulas, calculations, diagrams, drawings.

Recommended essay topics

1. Ecological state of agrosphere resources (land, water, biological)
2. Optimization of structure (agrolandscapes, agricultural lands, agrophytocenoses)
3. Ecological assessment of systems (agriculture, tillage, fertilizers, plant protection)
4. Assessment and standardization of anthropogenic load on natural resources of the agrosphere (agrotechnologies, agrochemicals, industrial enterprises)
5. Regularities of pollutant migration in agroecosystems
6. Ecological condition of residential areas
7. Basics of environmental safety in the agro-industrial complex
8. Adaptation of agricultural production to projected climate change
9. Agro-environmental monitoring
10. Ecological principles of waste from agro-industrial production

8. Teaching methods

1. Methods based on sources of information - visual (method of illustration, modeling and observation), practical (laboratory, practical and research work)
2. According to the degree of activation of creative activity - business games, round table method and "maze of actions".
3. According to the level of independent cognitive activity - problem-information, problem-search and research methods.
4. Interactive methods - scenario method, work in small groups.

9. Forms of control

Student knowledge is assessed on a 100-point scale and converted to national grades according to Table 1 "Regulations on Exams and Tests at NULES of Ukraine" (order on implementation of 26.04.2023, protocol No. 10).

Table 1. - Scale of evaluation of students

Applicant rating higher education, points	National assessment for the results of examinations	
	exams	test
90-100	perfectly	credited
74-89	good	
60-73	satisfactorily	
0-59	unsatisfactorily	not credited

10. Methodical support

1. Textbooks, manuals, workshops.
2. Workbooks and journals, scientific and methodological recommendations and guidelines.

11. Recommended books

Basic

1. Vagaliuk L. Lecture notes for the "Bachelor" students in the discipline "Agroecology" Lecture notes.- K.: Компрінт, 2021.- 117 с.
2. M FAO (2018b) The state of world fisheries and aquaculture 2018. Fisheries and Aquaculture Department of the Food and Agriculture Organization of the United Nations, Rome, <http://www.fao.org/docrep/016/i2727e/i2727e.pdf>
3. Eickhout B, Bouwman AF, van Zeijts H (2016) The role of nitrogen in world food production and environmental sustainability – agriculture. *Ecosyst Environ* 116:4–14
4. Evenson RE, Gollin D (2018) Assessing the impact of the green revolution, 1960 to 2000. *Science* 300:758–762
5. Vagaliuk L. Guidelines to conduct practicals in the discipline: "Agroecology".- K.: Компрінт, 2021.- 66 с.
6. FAO (2018) World agriculture: towards 2015/2030 – An FAO perspective. Food and Agriculture Organization of the United Nations, Rome. Earthscan Publications, London/www.fao.org/fileadmin/user_upload/esag/docs/Interim_report_AT2050web.pdf

ADDITIONAL RESOURCES

1. FAOSTAT. The statistical database of the Food and Agriculture Organization (FAO), Rome. <http://www.faostat.fao.org/>
2. Foley JA, Ramankutty N, Brauman KA, Cassidy ES, Gerber JS (2011) Solutions for a cultivated planet. *Nature* 478:337–342
3. Godfray H CJ, Beddington JR, Crute IR, Haddad L (2010) Food security: the challenge of feeding billion people. *Science* 327:812–818
4. Grenz JH, Sauerborn J (2017) Mechanisms limiting the geographical range of the parasitic weed *Orobanche crenata*. *Agric, Ecosyst Environ* 122:275–281
5. Hibberd JM, Sheehy JE, Langdale JA (2008) Using C4 photosynthesis to increase the yield of rice– rationale and feasibility. *Curr Opin Plant Biol* 11:228–231

6. IPCC (2017) Climate change 2001: synthesis report. Cambridge University Press, Cambridge, http://www.grida.no/publications/other/ipcc_tar/

7. IPCC (2007) Fourth assessment report: climate change 2007: synthesis report. http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

8. ISWA (2012) Ermittlung der Mengen weggeworfener Lebensmittel und Hauptursachen für die Entstehung von Lebensmittelabfällen in Deutschland. Zusammenfassung einer Studie der Universität Stuttgart, Institut für Siedlungswasserbau, Wassergüte und Abfallwirtschaft (ISWA). http://www.iswa.unistuttgart.de/afw/aktuelles/tagungen/tagungen_download/03-12-Studie_Lebensmittel_Factsheet.pdf

9. Met Office Hadley Centre for Climate Prediction and Research (2015) <http://www.metoffice.gov.uk/climate-change/resources/hadley>

INTERNET RESOURCES

1. <http://www.ngo.org.ua>
2. <http://proeko.visit.net/>
3. <http://www.dossier.Kiev.ua>
4. <http://www.rek-Kiev.org.ua>
5. <http://wjwwerm.com/>