

**NATIONAL UNIVERSITY OF LIFE
AND ENVIRONMENTAL SCIENCES OF UKRAINE**

Department Forest Restoration and Meliorations

"CONFIRMED"

Director of the Education and Research Institute
of Forestry and Landscape-Park Management

Roman VASYLYSHYN

"31" May 2024

"APPROVED"

at the meeting of the department
Forest Restoration and Meliorations
Protocol № 23 dated "17" May 2024

Head of the Department

Andrii PINCHUK

"REVIEWED"

Program Coordinator

"Forest Management in Eastern Europe"

Oleksandr BALA

PROGRAM OF THE COURSE

Agroforestry systems, practices and technologies

Area of knowledge 20 "Agrarian sciences and food production"

Specialization 205 "Forestry"

Educational program "Forest Management in Eastern Europe"

Institute Education and Research Institute of Forestry
and Landscape-Park Management

Developers: Professor of the Forest Restoration and Meliorations Department,
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(position, academic degree, academic title)

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(position, academic degree, academic title)

Kyiv – 2024

Description of the course Agroforestry systems, practices and technologies
(title)

Field of knowledge, specialization, educational program, educational degree		
Educational degree	Master	
Specialization	205 «Forestry»	
Educational program	Forest Management in Eastern Europe	
Characteristics of the course		
Type	Selective	
Total number of hours	150	
Number of ECTS credits	5	
Number of content modules	3	
Course project (work) (if applicable)	-	
Form of assessment	Exam	
Indicators of the course for full-time and part-time forms of study		
	Full-time form of study	Part-time form of study
Course (year of study)	1	
Semester	3	
Lecture classes	20 hr.	
Practical, seminar classes	20 hr.	
Laboratory classes		
Self-study	110 hr.	
Individual assignments		
Number of weekly classroom hours for the full-time form of study	3 hr.	

1. Purpose, objectives, and competencies of the course

The aim of the discipline "Agroforestry systems, practices, technologies" is to study the impact of woody plant species on improving soil conditions and environment, increasing the agro-landscapes by creating different types of agroforestry plantations, their spatial location in agro-landscapes and urban landscapes and management of agroforestry landscapes.

The subject of the discipline "Agroforestry systems, practices, technologies" is a system of general principles and approaches related to scientific and practical activities in the field of agroforestry, forestry and urban ecology, and landscape science.

The objectives of the discipline are:

- acquisition of skills to apply the theoretical knowledge obtaining in the learning process on agroforestry, phytomelioration, urban ecology.
- gaining experience in the ability to substantiate agroforestry approaches to the design and creation of agroforestry plantations, optimization of the ecological component.

Competencies of the educational program (GC):

Integrated competency (IC):

Ability to solve complex tasks and problems in the field of agroforestry in the process of learning, which involves conducting research or implementing innovations and is characterized by uncertainty of conditions and requirements.

General competences (GC)

GC 7. Ability to work in an international context.

Special (professional, subject) competences (SC)

SC 3. The ability to evaluate regional peculiarities of natural and climatic conditions for the organization of effective agroforestry, the performance of various functions by forests and the increase of forest areas.

SC 5. Ability to integrate knowledge and solve complex forestry problems in broad or multidisciplinary contexts

Program learning outcomes (PLO):

PLO 1. Specialized conceptual knowledge, which includes modern scientific achievements in the field of agroforestry and is the basis for original thinking, ensuring sustainable development and conducting research.

PLO 2. Communicate freely orally and in writing in Ukrainian and foreign languages when discussing professional issues, research and innovations in the field of forestry.

PLO 4. Search for necessary data in scientific literature, databases and other sources, analyze and evaluate these data;

PLO 7. Develop and implement scientific and applied projects in the field of forestry, taking into account available resources and risks, as well as economic, legal and environmental aspects.

PLO 11. Apply modern experimental and mathematical methods, digital technologies and specialized software to solve complex problems of forestry and hunting.

PLO 12. Conduct research and/or conduct innovative activities in order to obtain new knowledge and create new technologies and products in forestry and hunting and in wider multidisciplinary contexts.

2. Program and structure of the course

Names of content modules and topics	Number of hours												
	Full-time form							Part-time form					
	weeks	total	including					total	including				
			<i>l</i>	<i>p</i>	<i>lab</i>	<i>ind</i>	<i>self</i>		<i>l</i>	<i>p</i>	<i>lab</i>	<i>ind</i>	<i>self</i>
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Content Module 1. Structure, anthropogenic impacts and monitoring of agroforestry landscape													
Topic 1. Agroforestry is a key element of land use	1-2	14	2	2			10	-	-	-	-	-	-
Topic 2. Structure of agroforestry landscape and anthropogenic impacts	3-4	23	4	4			15	-	-	-	-	-	-
Topic 3. Agroforestry monitoring	5	17	2	-			15	-	-	-	-	-	-
Total for content module 1	54		8	6			40	-	-	-	-	-	-

Content Module № 2. Aboveground and Belowground Interactions in Tree-Crop Agroforestry													
Topic 4. Differentiation of the territory according to erosion processes	6	16	2	4			10	-	-	-	-	-	-
Topic 5. Methods of conducting research on wind speed and snow accumulation in field protective forest plantations	7-8	19	2	2			15	-	-	-	-	-	-
Topic 6. Methods of planning and analyzing soil research in field protective forest plantations	9-10	14	2	2			10	-	-	-	-	-	-
Total for content module 2	49		6	8			35	-	-	-	-	-	-
Content Module № 3. Agroforestry and the Global Goals													
Topic 7. Agroforestry for ecosystem services and environmental benefits	11-12	21	2	4	-		15		-	-	-	-	-
Topic 8. Social and economic implications of agroforestry for rural economic development	13-14	14	2	2			10						
Topic 9. Agroforestry practices implementation in Ukraine: current state, policy, challenges and prospective	15	12	2	-			10						
Total for content module 2	47		6	6			35		-	-	-	-	
Total hours	150		20	20			110		-	-	-	-	-

3. Practical class topics

№	Topic title	Number of hours
1	Analysis of the structural components of the landscape.	2
2	Determination of anthropogenic loads on landscapes	4
3	Landscape modeling in Archicad	4
4	Simulation of wind speed reduction in fields under protection of windbreaks. Determination of total wind protection and uniformity coefficient	2
5	Simulation of analysis of soil properties in fields under protection of windbreaks.	2
6	Restoration Opportunities Assessment Methodology (ROAM) as a tool of involving agroforestry practices in forest landscape restoration and Individual Act	4
7	PESTE analysis of Agroforestry practices implementation	2

4. Self-work topics

№	Topic title	Number of hours
1.	Structure of agroforestry landscape and anthropogenic impacts	40
2.	Aboveground and Belowground Interactions in Tree-Crop Agroforestry	35
3.	SWOT-analysis of different agroforestry practice types	35

5. Means of diagnosing learning outcomes:

(choose the necessary or supplement)

During the study of the discipline, we use the following means of learning diagnostics: exam; module tests; calculation and calculation-graphic works; protection of practical works.

6. Teaching methods

In the process of studying the discipline, an explanatory and illustrative teaching method is used, with the help of which students gain knowledge in lectures and practical classes, from educational and teaching-methodical literature. This method is widely used when submitting a large array of information.

The method of problem presentation is used in the process of practical classes, when the teacher poses a problem to the presentation of the material, formulates a cognitive task based on various sources and means, and shows the method of solving the task.

7. Forms of assessment

During the study of the discipline, the current forms of control are two content modules, and the final form of control is the credit.

8. Distribution of grades received by students

Evaluation of student knowledge is carried out on a 100-point scale and is converted to national grades according to Table 1 "Regulations and Examinations and Credits at NULES of Ukraine" (order of implementation dated 03.03.2021, protocol 7)

Student rating, points	National grade based on exam results	
	Exams	Credits
90-100	Excellent	Passed
74-89	Good	
60-73	Satisfactory	
0-59	Unsatisfactory	Not passed

In order to determine the rating of a student (listener) in the discipline R_{dis} (up to 100 points), the rating from the exam R_{ex} (up to 30 points) is added to the rating of a student's academic work R_{aw} (up to 70 points): $R_{dis} = R_{aw} + R_{ex}$.

9. Educational and methodological support

1. Agroforestry. Working program, methodic advices to the practical classes and self-works for students of Education level «Bachelor» Specialty: 193 - Geodesy and land inventory / V. Yukhnovskyi, O. Sovakov, G. Lobchenko. – K.: Comprint, 2024. 36 p.

2. Роговський С.В. Агролісомеліорація: практикум: навчальний посібник / С.В. Роговський, І.Д. Василенко, В.М. Черняк, В.М. Хрик, В.Ю. Юхновський // За ред. В.Ю. Юхновського. – К.: Фітосоціоцентр, 2011. – 292 с.

3. Малюга В.М. Агролісомеліорація. Робоча програма, методичні поради для виконання практичних занять і самостійної роботи студентів освітнього ступеня «Бакалавр» спеціальність 193 – «Геоземлізна та землеустрій» / Малюга В.М., Дударець С.М., Лобченко Г.О. – К.: Видавничий центр НУБІП України, 2020.

10. Recommended sources of information

1. Burgess PJ, Rosati A (2018) Advances in European agroforestry: results from the AGFORWARD project. *Afor Syst* 92:801–810. <https://doi.org/10.1007/s10457-018-0261-3>

2. Douglas G., Walcroft A., Hurst S. et al. Interactions between widely spaced young poplars (*Populus* spp.) and introduced pasture mixtures. *Agroforestry Systems*. 66(2). 2006. 165-178.

3. Forest restoration and melioration in Ukraine: origins, current state, challenges of the present and prospects in the anthropocene. Collective monograph (to the 100th anniversary of the Department of Forests Restoration and Forest Meliorations). K. NULESU, 2019. 350 p.

4. Garrett H., Buck L., Gold M. et al. Agroforestry: An Integrated Land-Use Management System for Production and Farmland Conservation. Resource Conservation Act (RCA) Appraisal of U.S. Agroforestry USDA Natural Resources Conservation Service, 1994. 58 p.

5. Graves AR, Burgess PJ, Palma JHN, Herzog F, Moreno G, Bertomeu M, Dupraz C, Liagre F, Keesman K, van der Werf W, de Nooy AK, van den Briel JPP (2007) Development and application of bio-economic modelling to compare silvoarable, arable, and forestry systems in three European countries. *Ecol Eng* 29:434–449. <https://doi.org/10.1016/j.ecoleng.2006.09.018>

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7. Hasanuzzaman M. Classification of agroforestry systems – [Електронний ресурс], режим доступу: <http://hasanuzzaman.webs.com/forstudents.htm>.

8. Kuemmel B (2003) Theoretical investigation of the effects of field margin and hedges on crop yields. *Agr Ecosyst Environ* 95:387–392. [https://doi.org/10.1016/S0167-8809\(02\)00086-5](https://doi.org/10.1016/S0167-8809(02)00086-5)

9. Long AJ, Nair PKR (1999) Tree outside forests: agro-, community, and urban forestry. *New Forests* 17(1–3):135–174

10. Moreno G, Aviron S, Berg S, Crous-Duran J, Franca A, García de Jalón S, Hartel T, Mirck J, Pantera A, Palma JHN, Paulo JA, Re GA, Sanna F, Thenail C, Varga A, Viaud V, Burgess PJ (2018) Agroforestry systems of high nature and cultural value in Europe: provision of commercial goods and other ecosystem services. *Agrofor Syst* 92:877–891. <https://doi.org/10.1007/s10457-017-0126-1>

11. Mosquera –Losada M., Moreno G., Pardini L. et al. Past, Present and Future of Agroforestry Systems in Europe. [Електронний ресурс]. Реж.дост.: http://www.agroof.net/agroof_research_documents/201210_eu_agroforesterie.pdf.

12. Mosquera-Losada M-R., Pantera A., Rosati A., Amaral J., Smith J., Rigueiro-Rodriguez A., Watte J., Dupraz C. What priorities for European Agroforestry? The First European agroforestry conference (Brussel, 9-10 October, 2012). 73.

13. Nuberg IK (1998) Effect of shelter on temperate crops: a review to define research for Australian conditions. *Agrofor Syst Int J* 41(1998):3–34

14. Palma JHN, Graves AR, Burgess PJ, van der Werf W, Herzog F (2007) Integrating environmental and economic performance to assess modern silvoarable agroforestry in Europe. *Ecol Econ* 63:759–767. <https://doi.org/10.1016/j.ecolecon.2007.01.011>
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23. Гладун Г.Б., Юхновський В.Ю. Агролісівництво як організаційно-просторове, екологічне і економічне удосконалення землекористування в Україні. Матеріали міжн. наук.-практ. конф. «Освіта, наука та інновації у лісовому і садово-парковому господарстві України в контексті регіональних та глобальних викликів». К. НУБіП України, 2010. С. 141–142.
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29. Food Agricultural Organization [Electronic resource] <http://www.fao.org>.
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