НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ	**COURSE SYLLABUS** **"Agroforestry systems, practices and technologies"**
	Degree of higher education - Master
	Specialization 205 "Forestry"
	Education program "Forest Management in Eastern Europe" **Academic year ___1____, semester ____3____** **Form of study full time**
	Number of ECTS credits ____5____
	Language of instruction English
	
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COURSE DESCRIPTION

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 agto-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, landscape science.

The objectives of the discipline are:

- acquisition of skills to apply the theoretical knowledge obtained 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

The discipline ensures the formation of a number of **competencies**:

Integrated competency (IC):

– the ability to solve the problems of agroforestry, the formation of the forest component of agrolandscapes, the evaluation of the amelioration effect of agroforestry plantations and their forest management.

***Competencies of the educational programme (GC)*:**

– Ability to learn and master modern knowledge.
– Ability to apply knowledge in practical situations
– Ability to communicate in a foreign language.
– Ability to use information and communication technologies.
– Ability to work autonomously.
– Ability to work in a team.
– Ability to realize one's rights and responsibilities as a member of society; awareness of the value of a civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine.
– The ability to preserve and multiply moral, cultural, scientific values and achievements of society based on an understanding of history, the patterns of development of the subject area, its place in the general system of knowledge about nature and society, as well as in the development of society, technology and technologies, to use different types and forms motor activity for recreation and leading a healthy lifestyle.

Professional (special) competencies (PC):

– Ability to apply theories, principles, methods of physico-mathematical, natural, socio-economic, engineering sciences when performing tasks of agroforestry management.

– Ability to choose and use effective methods, technologies and equipment for carrying out professional activities in the field of agroforestry.

– The ability to perform remote, ground, field and camera surveys, engineering calculations for the processing of survey results, form survey results, prepare reports when solving agroforestry management tasks.

– Ability to collect, update, process, critically evaluate, interpret, store, publish and use geospatial data and metadata about objects of natural and man-made origin.

– Ability to carry out professional activity in the field of agroforestry manaagement, taking into account the requirements of professional and civil safety, labor protection, social, ecological, ethical, economic aspects.

Program learning outcomes (PLO) of the educational programme:

– PLO2 Know the basic concepts at the level of the latest achievements forestry, sustainable development, and scientific methodology knowledge.

– PLO3. Convey information, ideas, problems, solutions, own experience and arguments to specialists and non-specialists.

– PLO4. Know and apply in professional activity regulatory and legal acts, regulatory and technical documents, reference materials in the field of agroforestry management and related fields.

– PLO5. Apply conceptual knowledge of natural and socio-economic sciences when performing tasks of agroforestry management.

– PLO6. To know the history and peculiarities of the development of agroforestry management, their place in the general system of knowledge about nature and society. Be able to communicate in a foreign language in scientific, industrial, and social spheres of activity

– PLO10. Select and apply the tools, equipment, equipment and software required for remote, terrestrial, field and camera surveys in the field of agroforestry management.

– PLO13. Identify areas for modernization of technological and production processes and implement the latest information technologies.

– PLO15. Develop and make effective decisions regarding professional activity in the field of agroforestry management, including under conditions of uncertainty.

– PLO16. Participate in educational activities among the population to form in them ecological thinking and consciousness, attitude to nature as a unique value.

COURSE STRUCTURE

Topics	Hours (lecture/ practical)	Learning outcomes	Tasks	Assessment
Semester 3				
Module 1. Structure, anthropogenic impacts and monitoring of agroforestry landscape				
Topic 1. Agroforestry is a key element of land use	4 / 6	To know and understand types of agroforestry, key benefits of Agroforestry. Analyse Experience of European countries in the implementation of Agroforestry and develop prospects for the development of Agroforestry in Ukraine.	Submission the practical work 1. Analysis of the structural components of the landscape.	**10**
Topic 2. Structure of agroforestry landscape and anthropogenic impacts	4 / 4	To know and understand structure of agroforestry landscape. Anthropogenic impacts and transformation of agroforestry landscapes. Evaluate anthropogenic impacts	Submission the practical work 2. Determination of anthropogenic loads on landscapes	**10**
Topic 3. Agroforestry monitoring	2 / -	To know and understand types of environmental monitoring, principles of monitoring organization.	Submission of self-work No 1 (including in elearn).	**10**
Module test No 1				**30**
Together for module 1	10 / 10			**100**
Module 2. Aboveground and Belowground Interactions in Tree-Crop Agroforestry				
Topic 4. Differentiation of the territory according to erosion processes	2 / 4	To know and understand land classes and technological groups of lands	Practical work №3. Landscape modeling in Archicad	**20**
Topic 5. Methods of conducting research on wind speed and snow accumulation in field protective forest plantations	4 / 4	To know and understand wind features. Be able to use in practice methods for determining the total wind protection, methods for determining the snow accumulation	Practical work № 4. Simulation of wind speed reduction in fields under protection of windbreaks. Determination of total wind protection and uniformity coefficient	**20**

Topic 6. Methods of planing and analyzing soil research in field protective forest plantations	4 / 2	Be able to use in practice methods of soil research, methods for determining the integrated coefficient of soil improvement. To know and understand influence of single field protective forest strips and different systems on soil properties.	Practical Work 5. Simulation of analysis of soil properties in fields under protection of windbreaks.	**20**
Module test No 2				**30**
Together per module №2	10 / 10			**100**
Modulus 3. Agroforestry and the Global Goals				
Topic 7. Agroforestry for ecosystem services and environmental benefits	4 / 6	To know and understand agroforestry practices place in achieving the Sustainable Development Goals (SDGs). Agroforestry for Forest Landscape Restoration. Contribution of Agroforestry into combating climate change and its impacts. Halting biodiversity loss due to functions of Windbreaks in the Landscape Ecological Network	Practical work 6. Restoration Opportunities Assessment Methodology (ROAM) as a tool of involving agroforestry practices in forest landscape restoration and Individual Act	**30**
Topic 8. Social and Economic Implications of Agroforestry for Rural Economic Development	4 / 4	To know and understand agroforestry practices for achieving food security and improved nutrition. Agroforestry as a tool for Sustainable Agriculture Promotion. Challenges and perspectives for Rural youth employment.	Practical work 7. PESTE analysis of Agroforestry practices implementation	**20**
Topic 9. Agroforestry practices implementation in Ukraine: current state, policy, challenges and prospective	2 / -	To know and understand Review of the regulatory framework. Initiatives on shelterbelts and windbreaks restoration in Ukraine. Role of scientific institutions, NGO's, landowners etc. in reserve of agroforestry traditions. Challenges and prospective in upgraded Agroforestry practices implementation.	Self-work 2. SWOT-analysis of different agroforestry practices types	**20**
Module test No 3				**30**
Together per module No 2	10 / 10			**100**
Total for semester 3	30 / 30			**70**
Final certification				**30**
Final evaluation				**100**

ASSESSMENT POLICY

Policy regarding deadlines and resist:	Works performed correctly and completed during the classroom session are exempt from oral defense. Works that are submitted late without good reason are evaluated with a lower grade according to the evaluation criteria. Modules can be rearranged with the permission of the lecturer if there are good reasons (for example, sick leave).
Academic honesty policy:	Writing off during tests and assessments is prohibited (including using mobile devices and other gadgets). Presentations must have correct text references to the used literature.
Attendance policy:	Attending classes is mandatory. For objective reasons (for example, illness, participation in scientific and technical events, international internship), training can take place individually (in online form with the agreement of the dean of the faculty)

SCALE OF ASSESSMENT OF STUDENT KNOWLEDGE

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

RECOMMENDED SOURCES OF INFORMATION

1. Basic Literature

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. Chirko CP, Gold MA, Nguyen PV, Jiang JP (1996) Influence of direction and distance from trees on wheat yield and photosynthetic photon flux density (Qp) in a Paulownia and wheat intercropping system. For Ecol Manage 83:171–180. https://doi.org/10.1016/0378-1127(96)03721-8

3. 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.

4. 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.

5. Garrett H., Buck L., Gold M. et all. 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.

6. 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

7. Gruenewald H, Brandt BKV, Schneider BU, Bens O, Kendzia G, Hüttl RF (2007) Agroforestry systems for the production of woody biomass for energy transformation purposes. Ecol Eng 29:319–328. https://doi.org/10.1016/j.ecoleng.2006.09.012

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

9. 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

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

11. 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

12. Moreno G, Obrador JJ, García E, Cubera E, Montero MJ, Pulido F, Dupraz C (2007) Driving competitive and facilitative interactions in oak dehesas through management practices.

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

14. 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_ressources /documents /201210_eu_agroforesterie.pdf.

15. Mosquera-Losada M-R., Pantera A., Rosati A., Amaral J., Smith J., Rigueiro-Rodn'guez A., Watte J., Dupraz C. What priorities for European Agroforestry? The First European agroforestry conference (Brussel, 2012).

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

17. 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

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20. Reisner Y., de Filippi, Herzog F. et al. Target regions for silvoarable agroforestry in Europe. Ecological Engineering. 29(4). 2007. P. 401–418.

21. Rigueiro-Rodriguez A., VcAdam J., Vosquera-Losada MR. Agroforestry in Europe Current Status and Future Prospect. Springer. 2009.

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24. Stancheva J., Bencheva S., Petkova K. et al. Possibilities for agroforestry development in Bulgaria: Outlooks and limitations. Ecological Engineering. 29(4). 382–387.

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26. Агролісомеліорація: підручник / В.Ю. Юхновський, С.М. Дударець, В.М. Малюга // За ред. В.Ю. Юхновського. – К.: Кондор-Видавництво, 2012. – 372 с.

2. Additional Literature

1. Довідник з агролісомеліорації (За ред П.С. Пастернака). – К.: Урожай, 1998. 288 с.

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. Юхновський В.Ю. Лісові меліорації: практикум. навчальний посібник / В.Ю. Юхновський, С.М. Дударець, В.М. Малюга, О.В. Соваков // За ред. В.Ю. Юхновського. – К.: Кондор-Видавництво, 2015. 232 с.

4. 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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6. Лісові меліорації: підручник / [Пилипенко О.І., Юхновський В.Ю., Дударець С.М, Малюга В.М.] ; за ред. В.Ю. Юхновського. – К. : Аграрна освіта, 2010. – 282 с.

3. On line resourses

1. European agroforestry federation [Electronic resource] www.agforward.eu .

2. Pan-European Biological and Landscape Diversity Strategy and Landscape Strategy. http://www.unep.org/roe/PromotingBiodiversityConservation/tabid/54597/Default.aspx.

3. AFTA (Association for Temperate Agroforestry) Definitions. [Electronic resource] http://www.agroforestry.ac.uk/systems/index.hmtl.

4. Food Agricultural Organization [Electronic resource] http://www.fao.org.

4. Legislation

1. The Law of Ukraine "On Land Development" of January,14, 2000. Number 1389-XIV // Governmental Courier. - 2000. - № 29. - P. 3-10.

2. The Concept of Agroforestry in Ukraine [approved by the Cabinet of Ministers of Ukraine of September, 18, 2013. № 725-p].

3. Правила утримання та збереження полезахисних лісових смуг, розташованих на землях сільськогосподарського призначення (Постанова Кабінету Міністрів України від 22 липня 2020 р. № 650) Режим доступу: https://zakon.rada.gov.ua/laws/show/650-2020-%D0%BF#Text.