NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

Department of forest mensuration and forest management

"CONFIRMED"
Director of the Education and Research Institute of Forestry and Landscape-Park Management
_____ Roman Vasylyshyn
«03» 06 2024 р.

"APPROVED"
at the meeting of the department of forest mensuration and forest management
Protocol No 11 dated May 20, 2024
Acting head of Department
_____ Viktor Myroniuk

"REVIEWED"
Program Coordinator _____ Oleksandr Bala

PROGRAM OF THE COURSE

Forest Inventory and Mapping

Specialization 205 – Forestry

Educational program Forestry

Education and Research Institute of Forestry and Landscape-Park Management

Developers: Professor, Doctor of Agricultural Sciences Viktor Myroniuk
(position, academic degree, academic title)

Kyiv – 2024

Description of the course Forest Inventory and Mapping
(title)

Field of knowledge, specialization, educational program, educational degree		
Educational degree	*Master*	
Specialization	*205 – Forestry*	
Educational program	*Forestry*	
Characteristics of the course		
Type	Elective	
Total number of hours	180	
Number of ECTS credits	6.0	
Number of content modules	2	
Course project (work) (if applicable)	*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*	*1*
Semester	*2*	*2*
Lecture classes	*20 hr.*	*8 hr.*
Practical, seminar classes	*30 hr.*	*8 hr.*
Laboratory classes	–	–
Self-study	*120 hr.*	*164 hr.*
Individual assignments	–	
Number of weekly classroom hours for the full-time form of study	*5 hr.*	

1. Purpose, objectives, and competencies of the course

The study course is aimed at methodological foundations of forest resource assessment using sample-based forest inventory. The course discovers applied aspects of the sampling approach used to obtain accurate and timely information on forests to support effective forest management. The specific focus of the course is a remote sensing-based forest cover mapping that integrates field observations collected on sample plots and satellite imagery.

Objectives of the course are as follows:

– overviewing methods of national forest inventories used in various countries;

– studying the theory and practical applications of sample-based methods in forest resource assessment;

– getting skills in field surveys using sampling methods;

– gaining knowledge in forest attribute assessment using sample data;

– practicing in interpretation of remote sensing data using both visual and automated approaches.

Acquisition of competencies::

Integrated competency (IC):

– The ability to resolve complex tasks in forestry or during study process that require investigations or innovations (Здатність розв'язувати складні задачі і проблеми у галузі лісового та мисливського господарства або у процесі навчання, що передбачає проведення досліджень або здійснення інновацій та характеризується

невизначеністю умов і вимог).

General competencies (GC):

- The ability to search, process and analyze information from various sources (ЗК 2. Здатність до пошуку, оброблення та аналізу інформації з різних джерел)
- The ability to use information and communication technologies (ЗК 3. Здатність використовувати інформаційні та комунікаційні технології)
- The ability to work in an international context (ЗК 7. Здатність працювати в міжнародному контексті).

Special (professional) competencies (SC):

- The ability to integrate knowledge and solve complex forestry issues in broad or multidisciplinary contexts (СК 5. Здатність інтегрувати знання та розв'язувати складні задачі лісового господарства у широких або мультидисциплінарних контекстах).

Program learning outcomes (PLO):

- Fluent oral communication and writing skills in Ukrainian and foreign languages dur-ing professional discussion, research and innovations in forestry (РН 2. Вільно спілкуватись усно і письмово українською та іноземною мовами при обговоренні професійних питань, досліджень та інновацій у сфері лісового господарства)
- Searching for the necessary data in scientific literature, databases and other sources, experience in analysis and evaluation of obtained data (РН 4. Відшуковувати необхідні дані в науковій літературі, базах даних та інших джерелах, аналізувати та оцінювати ці дані)
- Assessing state of forest stands, forest resources in specific forest vegetation conditions, forecasting their potential usage (РН 6. Оцінювати стан лісових фітоценозів, лісові ресурси в конкретних лісорослинних умовах, їх потенціал та прогнозувати можливості використання)
- Developing and improving technological and production processes, implementing modern digital technologies (РН 8. Розробляти та вдосконалювати технологічні і виробничі процеси, впроваджувати сучасні цифрові технології)
- Applying modern experimental and mathematical methods, digital technologies, and specialized software to solve complex issues in forestry and game management (РН 11. Застосовувати сучасні експериментальні та математичні методи, цифрові технології та спеціалізоване програмне забезпечення для розв'язання складних задач лісового та мисливського господарства)..

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				
			l	p	lab	ind	self		l	p	lab	ind	self
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Module 1. Methodology of sample-based forest inventory													
Topic 1. National forest inventory: historical background and emerging challenges	1	14	2	2			10	15					15
Topic 2. Sampling design in forest inventories	2	16	2	4			10	15	2				13

Names of content modules and topics	Number of hours												
	Full-time form							Part-time form					
	weeks	total	including					total	including				
			l	p	lab	ind	self		l	p	lab	ind	self
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Topic 3. Overview of sampling units	3	14	2	2			10	15			2		13
Topic 4. Measuring live trees and dead wood on sample plots	4	16	2	4			10	15			2		13
Topic 5. Inventory of standing trees using sampling with varying probability	5	14	2	2			10	15	2				13
Topic 6. Estimation of areal means and variances of forest attributes	6	16	2	4			10	15					15
Total for module 1		**90**	**12**	**18**			**60**	**90**	**4**		**4**		**82**
Module 2. From sample plots to forest maps													
Topic 7. Remote sensing technologies for enhancing forest inventories	7	14	2	2			10	15			2		13
Topic 8. Reference data for image classification	8	16	2	4			10	15	2				13
Topic 9. Mapping discrete and continuous forest attributes	9	14	2	2			10	15			2		13
Topic 10. Map accuracy assessment	10	16	2	4			10	15	2				13
Total for module 2	–	**60**	**8**	**12**			**40**	**60**	**4**		**4**		**52**
Total hours	–	**150**	**20**	**30**			**100**	**150**	**8**		**8**		**134**

3. Practical class topics

№	Topic title	Number of hours
1	Sampling frame design	2
2	Importing surveys into Open Foris Collect	2
3	Preparing custom code lists for interpretation	4
4	Creating land cover interpretation scheme	4
5	Land cover interpretation	4
6	Analyzing data with Saiku Server	2
7	Satellite image mosaicking	4
8	Land cover classification	4
9	Map accuracy assessment	2
10	Estimation of forested area	2
	Total	30

4. Self-study topics

№	Topic title	Number of hours
1	Exploring Quantum GIS	60
2	Land cover atlas	60
	Total	120

5. Diagnostics of program learning outcomes

- examination;
- module tests;
- practical assignments.

6. Teaching methods

All tasks and assignments are completed in a computer lab using relevant software and algorithms. The instructions for completing tasks are provided on Elearn online platform.

7. Forms of assessment

Lab assignments (10), self-study assignments (2), midterm tests (2), final exam.

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 April 26, 2023, protocol No 10).

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

Elearn online study course at https://elearn.nubip.edu.ua/course/view.php?id=872.

10. Recommended sources of information

1. Congalton, R. G., & Green, K. (2008). *Assessing the Accuracy of Remotely Sensed Data: Principles and Practices, Second Edition*.
2. Kangas, A., & Maltamo, M. (Eds.). (2006). *Forest inventory: Methodology and applications*. Springer.
3. Kershaw, J. A., Ducey, M. J., Beers, T., & Hush, B. (2016). *Forest Mensuration*, 5th ed.
4. Tomppo, E., Gschwantner, T., Lawrence, M., & McRoberts, R. E. (Eds.). (2010). *National forest inventories: Pathways for common reporting*. Springer.
5. Tutorials – Open Foris. (n.d.). Retrieved May 15, 2023, from https://openforis.org/tools/collect-earth/tutorials/