Degree of higher education – Master
Specialty 205 – Forestry
Educational program "Forestry"
Academic year 1, semester 2
Form of study Full-time
Number of ECTS credits 5.0
Language of instruction English

_____
Course lecturer   **Viktor Myroniuk**

Lecturer's contact   **victor.myroniuk@nubip.edu.ua**
information (e-mail)

COURSE DESCRIPTION

The course is focused on the theoretical foundations of the sample-based forest inventory which in combination with remote sensing data provides a spatially explicit assessment of forest attributes. It is designed to provide students with training in forest inventory using fixed- and variable-area plots and introduce the approaches for optimization of sampling design as well as statistical computations in national forest inventory. The course also introduces the necessary knowledge to map forest attributes using machine learning and imputation techniques. Upon completion of the course, students will be able to develop workflows that integrate reference observations (field plots or photo interpretation) to map forest cover characteristics using satellite imagery.

Competencies of the educational program:

Integrative 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 during 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).

STUDY COURSE STRUCTURE

Lecture Topic	Hours (lectures/ laboratory/ individual work)	Learning outcomes	Assignments	Grading
3rd Semester				
Module 1. Methodology of sample-based forest inventory				
Theme 1. National forest inventory: historical background and emerging challenges	2/2/6	*To know* the historical background of forest inventories and sampling strategies that are utilized in various countries of the world, configurations of sample units of forest inventories, and associated estimation procedure of key forest attributes. *To be able* to design sampling frame in GIS; to perform an evaluation of areal means of forest attributes.	*Submission of practical assignments.* *Submission of assignments for individual work.*	*Completed assignments for laboratory and individual work make up a grade of 55%, and the module test makes up 45%.*
Theme 2. Sampling design in forest inventories	2/4/10			
Theme 3. Overview of sampling units	2/2/12			
Theme 4. Measuring live and dead components on forest plots	2/4/12			
Topic 5. Inventory of standing trees using sampling with varying probability	2/2/12			
Theme 6. Estimation of areal means and variances of forest attributes	2/4/6			
Module 2. From plots data to forest maps				
Theme 7. Remote sensing technologies for enhancing forest inventories	2/2/16	*To know* he physical principles of passive and active remote sensing; satellite-based sensors and	*Submission of practical assignments.*	*Completed assignments for laboratory and individual work make up a grade*

Lecture Topic	Hours (lectures/ laboratory/ individual work)	Learning outcomes	Assignments	Grading
Theme 8. Reference data for image classification	2/4/16	their use in forest inventory; algorithms for image classification including the imputation of forest attributes	*Submission of assignments for individual work.*	*of 55%, and the module test makes up 45%.*
Theme 9. Mapping discrete and continuous forest attributes	2/2/16	*To be able* to combine forest attribute measurements on sample plots and satellite imagery to map species distribution and growing volume of forest stands; assess the accuracy of discrete and continuous maps.		
Theme 10. Map accuracy assessment	2/2/14			
Total in 3rd semester	**20/30/100**	–		**70** 0,7*(100+100)/2
Test				**30**
Course total				**100**

ASSESSMENT POLICY

Policy regarding deadlines and results:	Deadlines are set for all the assignments. Practical works submitted in violation of deadlines without a good reason will be penalized by lower grade. Re-takes of module tests in presence of good reasons (e.g.: sick leave) take place on lecturer's permission.
Academic honesty policy:	Cheating during tests and examinations is strictly forbidden (including using mobile phones and tablets). All written works are checked for plagiarism and are allowed to be defended when the total share of properly referenced text is up to 20%.
Attendance policy:	Attendance is mandatory. For objective reasons (e.g.: sick leave, international internship) teaching can take place individually (online, under a warrant from the Institute's Director).

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. 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://open-foris.org/tools/collect-earth/tutorials/