AGROFORESTRY SYSTEMS, PRACTICE AND TECHNOLOGIES

Education and Research institute of forestry and landscape-park management

Lecturers	**Vasyl Yukhnovskyi, Dr.Sc., Professor** **Oleksandr Sovakov, PhD, Associate Professor** **Ganna Lobchenko, PhD, Associate Professor**
Term	**2**
Major	**Master**
ECTS credits	**5**
Control	**Exam**
Class-room hours	**40 hours (of them: lectures – 20 hours, practical classes – 20 hours)**

Subject overview

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 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.

Lectures:

1. Agroforestry is a key element of land use.
2. Structure of agroforestry landscape and anthropogenic impacts.
3. Agroforestry monitoring.
4. Differentiation of the territory according to erosion processes.
5. Methods of conducting research on wind speed and snow accumulation in field protective forest plantations.
6. Methods of planning and analyzing soil research in field protective forest plantations.
7. Agroforestry for ecosystem services and environmental benefits.
8. Social and Economic Implications of Agroforestry for Rural Economic Development.
9. Agroforestry practices implementation in Ukraine: current state, policy, challenges and prospective.

Practical classes:

1. Analysis of the structural components of the landscape.
2. Determination of anthropogenic loads on landscapes.
3. Landscape modeling in Archicad.
4. Simulation of wind speed reduction in fields under protection of windbreaks. Determination of total wind protection and uniformity coefficient.
5. Simulation of analysis of soil properties in fields under protection of windbreaks.
6. Restoration Opportunities Assessment Methodology (ROAM) as a tool of involving agroforestry practices in forest landscape restoration and Individual Act.
7. PESTE analysis of Agroforestry practices implementation.

FOREST ECOSYSTEM SERVICES

Forest Mensuration and Forest Management Department

Education and Research Institute of Forestry and Landscape-Park Management

Lecturer	**Ivan Lakyda**
Term	**3**
Major	**Master degree**
ECTS credits	**4**
Control	**Exam**
Class-room hours	**40 hours (of them: lectures – 20 hours, practical or laboratory classes – 20 hours)**

Subject overview

Forests as a biological object are of much greater value than the commercial timber harvested from them, especially in densely populated areas. The course addresses the description and quantification of forest ecosystem services, which helps to reflect the cumulative effect of forests on the environment. Quantitative assessment of the above-mentioned forest ecosystem services also creates prerequisites for their further economic evaluation. The main objectives of the discipline are: expanding the professional and scientific outlook and formation of ecological thinking; mastering the theoretical and practical principles of classification of ecosystem services, their role for sustainable development and implementation of the "green" economy; familiarization with biophysical and economic valuation of forest ecosystem services; study approaches to mapping forest ecosystem services; deepening understanding of economic concepts underlying the economic valuation of forest ecosystem services. As a result of studying the discipline "Forest Ecosystem Services" the student should be able to: apply the acquired knowledge, computer technology in calculations; to carry out biophysical and economic assessment of the most important services of forest ecosystems, to justify individual decisions on the importance of ecosystem services in specific conditions, to compare economic indicators for different services of forest ecosystems.

Lectures:

1. Introduction to Ecosystem Services
2. Ecosystem services: Provisioning (biotic and abiotic).
3. Forest ecosystem services: Regulation & Maintenance.
4. Forest ecosystem services: Cultural.

5. Ecosystem Services and Biodiversity.
6. Forest ecosystem services and types of values.
7. Basics of economic valuation of ecosystem services.
8. Overview of direct methods of economic valuation of ecosystem services.
9. Overview of indirect methods of economic valuation of ecosystem services.
10. Certification for ecosystem services.

Classes:

(practical, laboratory classes)

1. What are the benefits people from ecosystems?
2. Assessment of biophysical parameters of forest biomass.
3. Assessment of biophysical parameters of energy accumulated in forest biomass.
4. Provisioning forest ecosystem services.
5. Biodiversity assessment of forest ecosystems.
6. Forest ecosystem services and types of values.
7. Benefit transfer.
8. Economic assessment of carbon sequestrative function of forest ecosystems.
9. Economic valuation of oxygen productive function of forest ecosystems.
10. Identification of communication activities related to FSC ES claims.

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FOREST INVENTORY AND MAPPING

Forest Mensuration and Forest Management Department

Education and Research Institute of Forestry and Landscape-Park Management

Lecturer	**Viktor Myroniuk**
Term	**3**
Major	**Master degree**
ECTS credits	**5**
Control	**Exam**
Class-room hours	**50 hours (of them: lectures – 20 hours, practical or laboratory classes – 30 hours)**

Subject overview

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.

Lectures:

1. National forest inventory: historical background and emerging challenges.
2. Sampling design in forest inventories.
3. Overview of sampling units.
4. Measuring live and dead components on forest plots.
5. Inventory of standing trees using sampling with varying probability.
6. Estimation of areal means and variances of forest attributes.
7. Remote sensing technologies for enhancing forest inventories.
8. Reference data for image classification.
9. Mapping discrete and continuous forest attributes.
10. Map accuracy assessment.

Classes:

(practical, laboratory classes)

1. Sampling frame design.
2. Importing surveys into Open Foris Collect.
3. Preparing custom code lists for interpretation.
4. Creating land cover interpretation scheme.
5. Land cover interpretation.
6. Analyzing data with Saiku Server.
7. Satellite image mosaicking.
8. Land cover classification.
9. Map accuracy assessment.
10. Estimation of forested area.

IMPACT OF NATURAL DISTURBANCES ON GROWTH AND YIELD

Forest Mensuration and Forest Management Department

Education and Research Institute of Forestry and Landscape-Park Management

Lecturer	**Andrii Bilous**
Term	**3**
Major	**Master degree**
ECTS credits	**5**
Control	**Exam**
Class-room hours	**50 hours (of them: lectures –30 hours, practical or laboratory classes – 20 hours)**

Subject overview

The course considers the causes and impact consequences of biotic, abiotic and anthropogenic disturbances on the growth of stands, development of forest ecosystems and the dynamics of their services and forest management of different disturbances regimes. In this class, the enduring understanding of both opposite processes: 1) forming of global challenges in forestry as a result of accumulation and increasing disturbances, and 2) implementation of experience and technologies for the management of disturbed forests. Upon successful completion of this course, the student will be able to do: 1) identify the type of disturbances, identify the agent and the cause, assess the impact and plan the management of disturbed forest ecosystems, 2) predict challenges in forestry and takes preventive measures to prevent disturbances in forest ecosystems, and 3) make strategic decisions that unite efforts among foresters, scientists, policy makers to solve regional and global disturbances.

Lectures:

1. The state of the world's forests.
2. The main challenges for forests and forestry.
3. The main drivers of forest loss in the world and Ukraine.
4. Abiotic disturbance agents.
5. Biotic disturbance agents.
6. Impact of anthropogenic disturbances on forests.
7. Interaction of disturbances in forest ecosystems.
8. Direct and indirect impact of disturbances on forest ecosystems.
9. Impact of disturbances on the ecosystem services of forests.
10. Wildland or Wasteland: What is the Chornobyl Forest Silent About?
11. Management of impact of forest disturbances.

12. Impact of disturbances on the hunting economy.
13. Risks and forecast of disturbances in forest ecosystems of Ukraine.
14. Impact of forest disturbances on the environment.
15. Adaptation of forests to climate change as a tool to minimize large-scale disturbances.

Classes:

(practical, laboratory classes)

1. The current state of forests in Ukraine.
2. Dynamics of deforestation in the world.
3. Structure of forest losses and list of forest disturbances in Ukraine.
4. How to map forest masks, and associated forest loss and gain?
5. Using of Global Forest Change and Google Earth Pro.
6. Fire Information for Resource Management System.
7. Statistic forest data of The Food and Agriculture Organization.
8. Strategy of forestry in Ukraine.
9. Environmental impact assessment.
10. Tools the global initiative of restoration.

PEST MANAGEMENT IN FOREST OF EASTERN EUROPE

Education and Research institute of forestry and landscape-park management

Lecturers	**Sergiy Zibtsev Dr.Sc., Professor** **Oleksandr Soshenskiy, PhD, Associate Professor**
Term	**2**
Major	**Master**
ECTS credits	**6**
Control	**Exam**
Class-room hours	**60 hours (of them: lectures – 60 hours, practical classes – 30 hours)**

Subject overview

The purpose of the discipline is to train masters of the English-language master's program on the ability to timely monitor and predict epiphytosis and outbreaks of pathogens and pests and prescribe appropriate measures to combat them. Objectives of the discipline: to ensure the timely assimilation of external signs of the pathological process of the disease on the tree plant; to teach masters to make a qualified short-term, long-term and long-term forecast for the main pathogens and pests.

The subject of the discipline is to study the basics of monitoring and forecasting epiphytosis and outbreaks of pathogens and pests, reasonable prediction of the timing, level of spread and development of the pest (disease) and possible phenomena and processes in the phytosanitary state of biocenoses in the future.

Lectures:

1. Ecology and Dynamics of Forest Diseases.
2. Ecological groups of microorganisms of forest biocenoses: theoretical and applied aspect.
3. Phytosanitary monitoring of dominant pests.
4. Monitoring of dominant pathogens of woody plants.
5. Methods and technology of pathological examinations.
6. Basics of forecasting. Types of forecasts.
7. Prediction of mass outbreaks of insect number.
8. Leaf Defoliation and Discoloration.
9. Integrated pest management (part 1).
10. Integrated pest management (part 2).
11. Beneficial insects in the forest.
12. Birds and bats for pest suppression.
13. Weeds in the forest.
14. Plant quarantine.

Practical classes:

1. Different types of pests.
2. Pests on different parts of trees.
3. Classification of diseases.
4. Classification of fungi.
5. Classification of weeds.
6. Forecasting the spread of rots of woody plants.
7. Forecasting the development of diseases of woody plants.
8. Insects and deseases of Quercus robur L.
9. Insects and deseases of Pinus sylvestris L.
10. Insects and deseases of Betula pendula L.
11. Insects and deseases of Acer platanoides L.
12. Insects and deseases of Aesculus hippocastanum L.
13. Methods of IPM.
14. The crown canopy classes, leaf defoliation and discoloration.

SUSTAINABLE FORESTRY

Forest Mensuration and Forest Management Department

Education and Research Institute of Forestry and Landscape-Park Management

Lecturer	**Ivan Lakyda**
Term	**1**
Major	**Master degree**
ECTS credits	**4**
Control	**Exam**
Class-room hours	**30 hours (of them: lectures – 15 hours, practical or laboratory classes – 15 hours)**

Subject overview

The aim of the discipline is to study the theoretical foundations of sustainable forestry development and master practical tools to ensure sustainable forest management. The objectives of the course are:

study the theoretical foundations and practical mechanisms for achieving sustainable development; analyze the relevance, content and strategic importance of the global sustainable development goals; mastering the content of Global Goal 15 "Life on Land"; familiarization with global and regional trends in forestry development; study of environmental, economic and social prerequisites for sustainable forestry development; acquiring skills in the use of legislative, information, technological, economic and public tools to support sustainable forestry development and biodiversity conservation; development of strategic thinking and skills in managing sustainable forestry processes. As a result of studying the discipline, the student should be able to apply the acquired knowledge in practice in solving specific problems related to the management of sustainable forestry development; use international methodologies, statistical databases, application solutions and information resources to monitor the state of forests, biodiversity and the current state of forestry on the path to sustainable development; analyze criteria and indicators of sustainable forestry; to assess the impact of various types of land use, information technology, biotechnology development, forest certification and public activities on sustainable development.

Lectures:

1. What is Sustainable Forestry?
2. The Sustainable Development Goals.
3. Goal 15: Life on land.

4. Criteria and indicators of sustainable forest management.
5. Criteria and indicators for the conservation and sustainable management of temperate and boreal forests.
6. Conservation and sustainable use of forests and forest biodiversity.

Classes:

(practical, laboratory classes)

1. Analysis of sustainable development goals.
2. Challenges to implementation sustainable development goals.
3. Goal 15: Life on land.
4. Pan-European criteria and quantitative indicators for sustainable forest management.
5. Using data from the global forest resources assessment.
6. Using data from the Joint pan-European dataset.

VEGETATION FIRES: SCIENCE & MANAGEMENT

Education and Research institute of forestry and landscape-park management

Lecturers	**Sergiy ZIBTSEV Dr.Sc., Professor**
Term	**2**
Major	**Master**
ECTS credits	**6**
Control	**Exam**
Class-room hours	**40 hours (of them: lectures – 10 hours, practical classes – 30 hours,)**

Subject overview

The course address basics of vegetation fire science and management that recently become challenging problem for natural resource managers. Within the fire course students get skills in wildland fire management, fuels management, and restoration based on advancing knowledge of fire science, ecology, fire-related policy and social issues, and the latest tools and technology. The course covers fire conditions, tactics, and strategies to mitigate fire and fire behaviors, emphasizing wildland and urban interface fires. Includes an interdisciplinary review and study of wildfires as ecological process. Special attention will be paid to the role of vegetation fires in the context of global environmental change. Addresses current issues in fire ecology in Ukraine, Eastern Europe and globally, including readings and discussions of recent scientific literature.

Lectures:

1. Theoretical foundations of combustion and behavior of forest fires. Fire environment.
2. Fuels of landscape fires. Fire weather.
3. Fire regimes.
4. Fire management.
5. Methods of landscape fire research.

Practical classes:

1. Classifications of forest fuels materials, their theoretical justification and the possibility of application for the conditions of Ukraine. Wetting and drying of forest fuels materials. Calculation of the drying coefficient of forest fuels.

2. The use of weather forecasts in the calculation of meteorological indicators of fire danger from weather conditions. The method of compiling local scales of fire danger from weather conditions.

3. Analysis of the actual combustibility of the forests of Ukraine. The main criteria for assessing the actual combustibility of forests in Ukraine.

4. Strategies and tactics of fire suppression. Planning of prescribed burning. Organization of prescribed burning. Forecasting the spread of smoke.

5. The process of burning forest fuels. Calculation of the main combustion parameters. Calculation of parameters of low-level forest fires.