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TEMPUS PROJECT „SUPPORT FOR VOCATIONAL TRAINING IN SUSTAINABLE FORESTRY: A LIFELONG LEARNING APPROACH”

SPECIALIZED MODULE
IN SUSTAINABLE FORESTRY

Balti

2017

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Specialized module / S. Stadnic et al.; «SUSFOR Support for vocational training in sustainable forestry: a lifelong learning approach lifelong learning approach». – Balti, 2017. 92 p.

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CONTENT

PREFACE

Within the framework of the European Union's TEMPUS Program promoting the modernization of higher education in the EU's surrounding area and supporting implementation of Bologna Declaration, partners in the Joint Multi – country project "Support for Vocational Training in Sustainable Forestry: a lifelong learning approach" have developed a modular curriculum for different target groups of adult learners.

The curriculum reflects the paradigm shift in forestry and natural resource management declared by UN and implies a change in the way professional foresters, decision makers, academics, students, and general public at large should see, think, do or act in relation to forests, natural resources and the environment. Its objective is to instil changes not only in policies, programs and approaches but also in the capabilities of an institution and individuals involved in sustainable forestry. Any forestry institution, in order to be effective, must innovate its programs and processes, change its structure and develop competencies consistent with the demands and challenges of sustainable forestry.

The curriculum consists of four modules: Introductory (one course), basic (ten courses), advanced (ten courses) and specialized (ten courses), It is designed for municipal authorities and society at large to address the problems in the area of sustainable forestry.

In co-operation with three Russian higher educational institutions, the Republican Forestry Agency of the Republic of Buryatia, two Universities of the Republic of Moldova and EU partners from Spain, Austria and Finland, 31 courses grouped in four modules have been developed covering a wide

range of topical questions in the field of sustainable forestry. These courses are:

1. Economics and social development in forests;
2. Forestry and water resources;
3. The impact of climate change on forest;
4. Biodiversity indicators and forest management;
5. Natural hazards in forestry;
6. Ecological management in forestry;
7. Forest and production: Site quality and forest growth modeling (wood production included biomass for energy, best management practices);
8. IT technologies in forestry;
9. Remote sensing in forestry;
10. Agro-forestry systems management.

The introductory module deals with the key terms and theoretical basis of forestry and is an ideal preparation for training in 10 topics in the subsequent three modules. Learners who start to get involved in the field of forestry and sustainable forestry in particular, we recommend to read this introductory module first, before deepening in 10 topics of basic, advanced and specialized modules. Learners interested in the modules and further training can address also all involved university partners to get further information or training about the listed courses and modules.

The curriculum is designed so that learners will benefit from each course without overlaps, for instance those who take course “Biodiversity indicators and forest management” can find useful information in course “The impact of climate change on forest”, or “Ecological management in forestry”.

A team of authors expresses sincere appreciation to all the partners of the SUSFOR project, especially to the project coordinator – Jorge Alcazar,

University of Lleida, BSAA project coordinator – Zoya Yampilova, the European partners from the University of Lleida – Cristina Vega, University of Natural Resources and Applied Life Sciences of Austria – Willibald Loiskandl, Margarita Himmelbauer, University of Eastern Finland – Maxim Trishkin, the Forest Sciences Centre of Catalonia – Rosa Ricart, Jorge Camprodone for the opportunity to participate and implement the project, scientific and methodological assistance.

Co-funded by the Tempus Programme of the European Union

Project number 543946-TEMPUS-1-2013-1-ES-TEMPUS-JPHES (2013-4563/001-001)

SYLLABUS TITLE:
SOCIO-ECONOMIC DEVELOPMENT IN FORESTRY: FORESTRY AND NATURE TOURISM

FSEI HE 'Buryat State Academy of Agriculture named after E.R. Philippov"

Authors

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Ricart Rosa, Forest Sciences Centre of Catalonia

SPECIALIZED MODULE

SOCIO-ECONOMIC DEVELOPMENT IN FORESTRY: FORESTRY AND NATURE TOURISM

GENERAL INFORMATION

ECTS credits: 6

Total: 216 hrs

Theoretical part: 35%

Practical part: 65%

Target group:

Anyone who is directly or indirectly related with the business, especially those who consider employment in the field.

Modality:

Traditional (face-to-face).

Starting date:

01.09.2017

Language: Russian, English, Romanian

Address: Republic of Buryatia, Ulan-Ude, 8. Pushkin str. tel.: +73012442611

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ADDITIONAL COURSE INFORMATION

The course is aimed at learners who want to improve their knowledge and experience in Forest Recreation and Nature Tourism as Non-Wood Forest Products and Services (NWFPs). The program is open for students of 1st and 2nd cycle in Forestry, Landscape Architecture, Agricultural and Environmental Sciences, Business and Tourism, and other related scientific areas.

COMPETENCES

As a result of the course the learner should gain knowledge on the following competencies:

- ability to understand modern problems of social and economic development of forestry;
- ability to develop and implement measures for solving professional problems in the forestry sector to meet society's needs for forests and forest resources, depending on the purpose of forests and their useful functions;
- ability to efficiently use materials, equipment, the relevant principles in the implementation of activities in the field of social and economic development of forestry;
- ability to use elements of economic analysis in the organization and implementation of practical work, willingness to take moderate economic risk;
- ability to determine goals of the project (program), decisions of problems, criteria and indicators of achievement, construct the structure of their relationship, identify priorities in meeting needs, taking into account the moral aspects of activities and optimum use of the state of the natural and urban environment;
- willingness to develop activities and facilities of forestry, taking into account environmental, social and economic parameters.

LEARNING OBJECTIVES

This course aims to present relevant information about the emergent reality of forestry recreation and tourism in Russia and Moldova as NWFPs. It provides information on the available resources, their location relative to the population and their accessibility based on analysis of international GIS-databases. The learner will be informed of strategic aspects of forest recreation and tourism planning. The course aims also to show how specific information on demand and supply is needed to develop the strategic planning process that should be applied in a refined and focused way. The learner will learn also from practical experience in designing and managing forest recreation facilities. It will provide an overview of existing knowledge on the integration of forest recreation and tourism into the rural economy in contributing to the diversification of rural economies. This course presents key instruments and tools that can be used to promote the development of forests for recreational and tourism, drawing from examples.

LEARNING OUTCOMES

At the end of the course unit, the learner is expected to be able to:

- recognize the new reality of forest recreation and tourism in Russia and Moldova;
- make analysis of resources for forest tourism businesses;
- identify the potential and pressures of forest tourism on protected areas;
- apply planning techniques and programs to forest, cultural and ethnic tourism;
- discover cultural and environmental issues from local populations and visitors;
- acquire techniques in natural and cultural inheritance marketing for

forest tourism;

- project outdoor forest recreation infrastructures for occasional, short and long duration;
- apply financial management instruments (e.g.: taxes, profit and loss analysis etc.);
- make plans, reports based on factual economic data.

INTRODUCTION

The environmental merits of non-wood forest products and services (NWFPs), and the potentials and constraints in their realization are gaining in importance. It also identifies the environmental dimensions of NWFPs and provides broad guidelines for incorporating environmental considerations in NWFP management and utilization. The increasing demand for NWFPs and the disappearance of forest ecosystems have prompted an important decision by many countries to protect the existing forest ecosystems. NWFPs are no longer "minor forest products" but major products of great socio-economic value. They are harvested not only from natural forests, but also from areas under similar use and plantations. They may be part of woody plants such as bark, gum, leaves, fruits, oils, and flowers, or they may be part of the forest ecosystem, such as wildlife or grass. Some of the NWFPs are intangible, for example, recreational facilities and services.

Forest tourism represents a NWFPs with high potential economic value. Such tourism can generate support for conservation by:

- providing attractive financial return, it can justify setting aside large areas of forestlands for conservation;
- gate fees/entry fees that can generate substantial funds to support parks and reserves management;

- tourist expenditures in and around the parks (on lodging, transportation, goods, guides, and souvenirs) can be an important source of income for rural communities near protected areas and forests, compensating them for the loss of access to traditional resources and giving them incentive to conserve the protected areas.

Russia and Moldova are known as countries that have numerous types of ecosystems, ranging from beach ecotourism, marshes, lakes, forests, grasslands, and others. Both destinations are full of endemic flora and fauna. In addition, they have customs and cultural diversity. All of these are the attractiveness potential of forest tourism development. Realizing the beneficial opportunities of this sector, we must prepare ourselves by enhancing professional human resources. This course is expected to train a specialist who will play an active role as the spearhead of the chain of activities of forest tourism sector.

CONTENT

1. Recreation and recreational forest use

1.1. Concept of recreation, socio-economic nature and basic function of recreation

1.2. Areas of regulated recreational use

1.3. Recreational forest management: basic concepts and principles

1.4. Recreational functions of forest

1.5. Factors affecting the state of recreational areas. Sustainability of recreational forests.

2. Leisure and tourism in forests

2.1. The meaning of leisure and tourism

2.2. Fundamentals of tourism

2.3. Forest tourism: definition / structure

2.4. Forest tourism trends on national and international levels

3. Nature and environment

3.1. Natural, hydro mineral, cultural and historical resources

3.2. Cultural and historical potential

3.3. Careful for the environment and forest resources

4. Hospitality in arranging forest tourism

4.1. What is hospitality?

4.2. What are visitor's expectations?

4.3. Interpersonal skills and the importance of communication

4.4. Integration: family – forest – tourism

5. Accommodation

5.1. Quality standards

5.2. Types of accommodation

5.3. Location of accommodation

6. Food and nutrition

6.1. Food and catering services

6.2. Regional products and recipes

6.3. Forest products in food

7. Activities

7.1. Common indoor and outdoor recreational activities in the field of forest tourism

8. Special groups opportunities. For example, for people with disabilities

8.1. Management., marketing, promotion

8.2. Management skills of management theory

8.3. Financial management

8.4. Target groups

8.5. PR

8.6. Information for visitors

8.7. Regulation and safety in forest tourism

8.8. Normative-legal acts: basic legal requirements, taxes, insurance, laws, health and safety

8.9. Prevention of Accidents (First Aid \ Food Safety)

8.10. Safety conditions (Fire control, safety and equipment, evacuation routes)

METHODOLOGY

The syllabus will be implemented as:

- lectures, seminars, including interactive modes;
- case-study;
- final project.

DEVELOPMENT PLAN

Lectures, including interactive	Practical classes, including interactive	Students independent work	Final paper (project)
8 hrs.	16 hrs.	165 hrs.	27 hrs.

EVALUATION

At the end of the course, students present final paper (a project).

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SYLLABUS TITLE:

FOREST, FOREST MANAGEMENT AND WATER QUALITY

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Authors

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SPECIALIZED MODULE
FOREST, FOREST MANAGEMENT AND WATER QUALITY
GENERAL INFORMATION

ECTS credits: 6

Total: 180 hrs

Theoretical part: 35%

Practical part: 65%

Target group:

Entrepreneurs who want to gain more knowledge in a certain specialized subject

Modality:

a) Online collaborative learning;

b) Independent learning for auditors (by massive use of modern information and communication technologies (self-study learning);

c) Traditional instruction (face-to-face), conducted through lectures, practical and laboratory hours by using active and interactive methods of learning

Starting date*:

01.09.2017

Language: Romanian, Russian, English

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ADDITIONAL COURSE INFORMATION

This module is part of a LLL curricula in sustainable forestry developed in the framework of TEMPUS Project “Support for vocational training in sustainable forestry (SUSFOR)”. Partners in project have developed an LLL curricula in sustainable forestry intended for different learners for whom the suggested courses will be useful and interesting. The curriculum is designed in four modules: introduction, basic, advanced and specialized. The learner will be able to implement sustainable forestry practices through appropriate training and education programs of this modular curriculum.

The specialized module is designed for entrepreneurs who want to gain more knowledge in a certain specialized subject.

COMPETENCES

Identification of the solutions for maintaining the quality of water through proper forest management.

LEARNING OBJECTIVES

- Learning the basic notions regarding the relationship forest - water quality.
- Understanding (awareness) the impact of agro-forestry-technical activities on water quality parameters.
- Identifying the measures of improvement and prevention the consequences of agro-forestry-technical activities on water quality in water basins.

LEARNING OUTCOMES

After completing this course you will be able to:

- determine the water quality by measuring basic parameters of its quality;

- evaluate the water quality parameters based on the indicators of aquatic biota status;
- apply the acquired knowledge in order to achieve quality improvement of forest management;
- perform the forecasting and risk assessment of the impact of forestry activities on water quality;
- forecast the evolution and dynamics of water quality parameters and correlate them with forest management;
- suggest measures of preventing the negative impact of forest-technical activities on water quality.

INTRODUCTION

Aquatic resources represent one of the most valuable components of biosphere.

According to the DIRECTIVE 2000/60/CE OF THE EUROPEAN PARLAMENT AND THE COUNCIL OF THE EUROPEAN UNION establishing a framework for Community action in the field of water, the water, within the Community, is under increasing pressure, given the continued growth in demand for good quality water in sufficient quantity for all purposes. The continued growth of water consumption imposes the development of complex monitoring measures for protection and sustainable management of aquatic resources.

Moreover, an efficient and coherent water policy must consider the vulnerability of the aquatic ecosystems, their equilibrium being strongly influenced by various human activities. The protection of water status in these ecosystems will contribute to the preservation of the population health and will facilitate some economic benefits.

One of the main sources of pollution of water basins is the surface runoff from the chemically treated agricultural lands. Unfortunately, due to vast areas of such leaks and the impossibility of their targeting, these waters cannot be passed through the wastewater treatment plants. In this case, a set of scientifically grounded water protection measures is required which include entire watersheds. One of the priority items in solving this problem is occupied by forestry plantations. However, forest planting and exploitation activities represent, as well as other areas of the economy, a way of anthropogenic pressure on water resources. Forestry activities could generate the pollution of water with organic waste, fuels, pesticides, etc.

It is well known that one of the ecological functions of the forest is the maintenance of water quality parameters. Meanwhile, in terms of forest management organization by the mankind, this function gets new features which should be known and taken into account for efficient organization of water resource management.

Forests do not only contribute to the regulation of the water resources reserves and to the improvement of the quality of these resources, but also to the water purification from chemicals and pathogenic microorganisms.

During this course, we intend to approach scientifically the role and the importance of forests in maintaining the water quality parameters, along with the prevention and mitigation of negative processes such as siltation and eutrophication of water basins.

CONTENT

1.2 Chemical parameters

1.3 Biological parameters

2. FOREST MANAGEMENT AND WATER QUALITY PARAMETERS

2.1 Afforestation works

2.1 Forest exploitation work

2.3 Chemical processing

2.4 Other forestry works/activities

3. THE IMPACT OF CHANGES IN WATER QUALITY PARAMETERS ON THE AQUATIC BIOTA

3.1. Primary producers

3.2. Aquatic macro-invertebrates

3.3. Aquatic vertebrates

4. MEASURES OF PREVENTING THE NEGATIVE IMPACT OF AGRO-FOREST-TECHNICAL ACTIVITIES

4.1 Organizational and engineering measures

4.2 Agro-forest-technical measures

METHODOLOGY

The teaching modes:

- lectures, tutorials, seminars including interactive lectures and presentations;
- case-studies;
- intermediary and final control, tests

DEVELOPMENT PLAN

Lectures including interactive lectures	Practical classes, including interactive lectures	Independent studies
12 hrs.	12 hrs.	158 hrs.

EVALUATION

By the end of the course the learners will passes a written exam. A certificate of attendance will be awarded

REFERENCES

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SYLLABUS TITLE:

The impact of climate change on forest: wildlife in a changing climate

State Agrarian University of Moldova

Authors

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Sfecla Victor

Reviewers:

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SPECIALISED MODULE

The impact of climate change on forest: wildlife in a changing climate

GENERAL INFORMATION

ECTS credits: 6

Total: 180 hours/24 class-room hours/10 themes

Lectures: 12 hours

Seminars: 4 hours

Laboratory (forest): 8 hours

Independent studies: 156 hours

Target group:

Entrepreneurs who want to gain more knowledge on this particular specialized topic: wildlife in a changing climate

Modality:

Traditional (face-to-face)

Starting date*:

01.09.2017

Language: English, Romanian, Russian

Address:

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ADDITIONAL COURSE INFORMATION

The economic value of the forest and the richness of wildlife in Moldova were mentioned by Dmitrie Cantemir in his work “Descriptio Moldoviae” already in 1715. According to the Moldovan Law concerning natural resources (1997), national natural resources of Moldova are composed of soils, forests, waters, wildlife, and mineral solid substance (clay, sand, and limestone). Among them, soil has a particular value for the national economy, as it constitutes a fundamental natural resource (Strategy for social – economic development of RM until year 2005, 2002) that supports many other vital resources: habitats, species, the water cycle. However, extensive development of agriculture, massive construction of dwelling spaces, and soil pollution from industrial and domestic waste has led to degradation processes in soils such as erosion, land sliding, and desertification, which joined by overexploitation of forest and wildlife resources has led to severe sustainability problems in the country. Hence, policies favoring preferentially agriculture and cattle industries and ignoring forest and wildlife during centuries led Moldova to environmental problems and a catastrophically diminishing production, which jeopardizes the alimentary security of the country. “Economic growth based on consumption … is a greater danger associated with this model of economic growth... at one point in time, will start to decline” (IMF 2013).

According to the Constitution of the Republic of Moldova (1994) art. 37 (1) every human being has the right to live in an environment that is ecologically safe for life and health. The same article 37 (4) of our constitution make us

aware that “Private individuals and legal entities shall be held responsible before the law for any damages they may cause to personal health and property due to an ecological offense”. Under this mandate for good ecological conditions while penalizing environmental transgressions, conflicts between development and conservation may arise. The rural population may not perceive adequately the importance of the wildlife resource. A society that does not feel the necessity to see a running hare or to listen to the flight of duck faces what it has been called "empty forest syndrome" (2012) or in other words "defaunation".

The country cannot passively accept this "defaunation" perception in the rural society. If rural poverty reduction is a critical policy issue, then what may be needed is additional understanding of the role of forests and how biotic resources might be managed to increase their socio-economic contribution to rural communities (Guldin et al. 2005). Our objectives in this course include an analysis of the existing legislation as it represents an obstacle for stakeholder involvement and participatory management and sustainable use of wildlife.

COMPETENCES

Forest Managers must understand natural resource systems and how to organize the management of wildlife resources for multiple uses and multiple values in a changing climate. Successful Forest Managers must be able to communicate with the full spectrum of forest users and those who value wildlife resources. They must be able to propose management solutions that are compatible with the biological and ecological processes of the forest and wildlife in a changing climate yet are sensitive to the cultural, social and economic forces that shape forest policies.

LEARNING OBJECTIVES

- To create the ability for continuous lifelong development of the quality of life.
- To empower citizens through more personalized and innovative approaches to adult education.
- To have a sustainable knowledge – based society and economy.
- To make better use of education as a driver for growth, jobs, global competitiveness and social change.
- To contribute to fostering a learning culture that promotes creativity, independence, and responsibility.
- To improve the skills of individuals and strengthen the development of the enterprises.
- To match the needs of the labour market and society.
- To create curiosity and interest in learning of the wildlife in a changing climate.
- To develop new qualifications and competences related to wildlife in a changing climate.
- To improve skills sets those contribute to professionalism development, employment mobility, and active citizenship.
- By the end of the impact of climate change on forest: wildlife in a changing climate module, users should know: major climate-induced changes, consequences of climate change for wildlife, measures for adaptation of wildlife to climate change, causes of human-wildlife conflicts, human-wildlife conflict management, safeguarding wildlife and habitat from climate change through the conservation programs, factors that influence the “carrying capacity” of game species, integrated

management of trophic interactions.

- To understand the human-wildlife coexistence, including the reduction of conflict between humans and wildlife, the reduction of wildlife damage to crops and forests, and noninvasive pest control.

LEARNING OUTCOMES

- To describe the major climate-induced changes and consequences of climate change for wildlife.
- To solve problems associated with wildlife in a changing climate.
- To understand the role that wildlife play in the global carbon cycle.
- To appreciate the contribution of wildlife to climate change mitigation.
- To discuss the potential of sustainable forest/wildlife management for climate mitigation and adaptation.
- To design measures for adaptation of wildlife to climate change.
- To manage human-wildlife conflicts.
- To be able to observe factors that influence the “carrying capacity” of game species.
- To design a restoration plan.

CONTENT

Theory and practice contents (units / topics)

1. Major climate-induced changes
   1.1. Disturbance and extreme weather events
   1.2. Ecosystem and landscape changes
2. Consequences of climate change
   2.1. Altered ecosystems and landscapes
   2.2. Changes in species distribution, composition and interactions
   2.3. Conflicts at the human–wildlife–livestock interface

7. Human-wildlife coexistence, including the reduction of conflict between humans and wildlife, the reduction of wildlife damage to crops and forests, and noninvasive pest control
8. Factors that influence the “carrying capacity” of game species
   - 8.1. Abiotic factors
   - 8.2. Biotic factors
   - 8.3. Anthropic factors
   - 8.4. Wildlife management factors
9. Integrated management of trophic interactions
10. Wildlife Restoration; a synthesis
    - 10.1. Major messages
    - 10.2. Developing a restoration plan
    - 10.3. Information gaps
    - 10.4. Working with wildlife scientists and managers

METHODOLOGY

The teaching modes:

- lectures, seminars, laboratory (forest);
- computer room;
- field work, visits;
- guided activities;
- exam

DEVELOPMENT PLAN

Lectures	Seminars	Laboratory (forest)	Independent student work	Total
12 hrs.	4	8 hrs.	156 hrs.	180 hrs.

EVALUATION

Grading system and grading weight of lectures, seminars, report after laboratories based on the field inquiry, an essay and exam by the end of the course.

Instructions for the laboratory report based on the field inquiry: the members of each subgroup will write a lab report that reflects the work done during the 8 hours of the field inquiry in the forest. The report will be organized in a daily format describing: the objective(s) of the day; the questions of the inquiry; the process of the methodology indicating the important and critical steps/ points; the details of the calculations and the volumes used; the unexpected problems/mistakes and the interpretation of the results.

Instructions for the final work (essay)

Choose one of the following assignments:

A) A short case study on chosen topic (e.g., your Lifelong Learning research topic or other area of your personal interest) from the impact of climate change on forest: wildlife in a changing climate viewpoint.

Describe the research problem briefly.

Elaborate on what kind of the impact of climate change on forest approach could be adequate for the problem in question, and how it could be used as a theoretical / methodological.

Either report the actual analysis and the conclusions in a concise form, or describe how the analysis would proceed, if not actually realized here.

B) A critical commentary of a chosen text from the reading list.

Choose one of the texts from the reading list, or propose a suitable text from another source.

Read the text thoroughly. Make a note of the assumptions, key arguments,

original concepts, classifications and conclusions.

Using secondary texts and/or your own knowledge, identify arguments that e.g. would need more elaboration, do not stand on their own, are contradictory, etc.

Rephrase the original arguments concisely and accurately. After that, or side--by-side, introduce your critical remarks.

Please do not hesitate to state your opinion, but remember also to justify it plausibly.

C) A reflective comparison of two texts from the reading list.

Choose two texts from the reading list, preferably from the same section, or otherwise thematically related.

What presuppositions do the authors share? What not?

How is "the impact of climate change on forest: wildlife in a changing climate " understood and/or defined in the texts?

What kind of environmental, social, cultural, and/or political consequences do the texts suggest? On which conclusions do the authors seems to agree, and on which not?

The length of the essay should be at 5-8 pages (~ 12 000–18 000 characters, spaces included). Please use a font size of 12 pt and a line spacing of 1.5 in the body text. Submit your essay via e-mail to the instructor (vitalie.gulca@gmail.com) at the latest by Thu 7th October 17:00. The essays will be circulated among the participants, and then presented and discussed in the seminar session on 13–14th October. Discussants will be assigned for each paper.

Instructions for discussants:

Prepare a short general statement and 2–3 more specific comments or

remarks

Keep your comment concise (< 5 min)

Be critical, but in a fair and constructive manner

Publishing the essay

There is a possibility to publish the essay after the course in a new webzine Tempus.md. Ask more details from the course instructor.

Instructions for the final work (essay)

Choose one of the following assignments:

A) A short case study on chosen topic (e.g., your Lifelong Learning research topic or other area of your personal interest) from *the impact of climate change on forest* viewpoint.

- Describe the research problem briefly.
- Elaborate on what kind of *the impact of climate change on forest* approach could be adequate for the problem in question, and how it could be used as a theoretical / methodological.
- Either report the actual analysis and the conclusions in a concise form, or describe how the analysis would proceed, if not actually realized here.

B) A critical commentary of a chosen text from the reading list.

- Choose one of the texts from the reading list, or propose a suitable text from another source.
- Read the text thoroughly. Make a note of the assumptions, key arguments, original concepts, classifications and conclusions.
- Using secondary texts and/or your own knowledge, identify arguments that e.g. would need more elaboration, do not stand on their own, are contradictory, etc.

- Rephrase the original arguments concisely and accurately. After that, or side--by-side, introduce your critical remarks.
- Please do not hesitate to state your opinion, but remember also to justify it plausibly.

C) A reflective comparison of two texts from the reading list.

- Choose two texts from the reading list, preferably from the same section, or otherwise thematically related.
- What presuppositions do the authors share? What not?
- How is "*the impact of climate change on forest* " understood and/or defined in the texts?
- What kind of environmental, social, cultural, and/or political consequences do the texts suggest? On which conclusions do the authors seems to agree, and on which not?

The length of the essay should be at 5-8 pages (~ 12 000–18 000 characters, spaces included). Please use a font size of 12 pt and a line spacing of 1.5 in the body text. Submit your essay via e-mail to the instructor (vitalie.gulca@gmail.com) at the latest by Thu 7th October 17:00. The essays will be circulated among the participants, and then presented and discussed in the seminar session on 13–14th October. Discussants will be assigned for each paper.

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- Keep your comment concise (< 5 min)
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Publishing the essay

There is a possibility to publish the essay after the course in a new webzine Tempus.md. Ask more details from the course instructor.

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SYLLABUS TITLE:
BIODIVERSITY INDICATORS AND FOREST MANAGEMENT

FSEI HE 'Buryat State Academy of Agriculture named after E.R. Philippov"

Authors

Altaev Alexander

Voinkov Alexander

Reviewers:

Camprodone Jorge, Forest Sciences Centre of Catalonia

SPECIALISED MODULE

BIODIVERSITY INDICATORS AND FOREST MANAGEMENT

GENERAL INFORMATION

ECTS credits: 6

Total: 216 hrs

Theoretical part: 35%

Practical part: 65%

Target group:

Civil servants, business people, learners with higher forestry education

Modality:

Traditional (face-to-face)

Starting date:

01.09.2017

Language:

Russian

Department/Faculty*:

Silviculture and Forest inventory / Agronomy

Address: room 427, 8 Pushkin str., 670034, Ulan-Ude, Republic of Buryatia;

Tel.: (+73012) 443489, email: altaev@mail.ru

Teaching staff/coordinator*:

1. Associate Prof. Altaev A.A.

2. Associate Prof. Voincov A.A.

ADDITIONAL COURSE INFORMATION

The course is designed for non-academic learners – civil servants, specialists working in forestry business, learners with higher forestry education

COMPETENCES

By the end of the course learners should have formed the following competences:

1. Organize and manage forest biodiversity monitoring;
2. Apply national and international criteria and indicators of forest biodiversity in the professional activity;
3. Evaluate forest ecosystem biodiversity preservation criteria with the help of modern scientific methods;
4. Analyse biodiversity indicators and make decisions on the restoration of tree species and other forest elements diversity

LEARNING OBJECTIVES

Specialized module course “Biodiversity indicators and forest management” presents peculiarities and methods of forest biodiversity monitoring.

LEARNING OUTCOMES

By the end of the course learners are able to:

- ✓ Present and apply the set of forest biodiversity indicators;
- ✓ Explain criteria and indicators of sustainable forestry developed by Montreal process;
- ✓ Identify differences of Russian forest biodiversity indicators for different levels of monitoring;
- ✓ Evaluate parameters of ecosystem diversity;
- ✓ Evaluate diversity of forest vegetation using forest taxation data;
- ✓ Use methods of mapping diversity of species;
- ✓ Analyze GIS scanning data for evaluation of structural biodiversity of forests;
- ✓ Develop internal guideline of the business on preservation of biological

diversity during logging;

- ✓ Identify and preserve key BD elements of forest stand during logging;
- ✓ Carry out experiment on forest cut sites with aim of biodiversity preservation;
- ✓ Organize and manage forest biodiversity monitoring.

CONTENT

Monitoring of forests with the view of biodiversity conservation.

1. Objects and methods of evaluation of forest biodiversity

1.1. Natural wood

1.2. Antropogenically undisturbed forest

1.3. Quasi-natural forest

2. Forest biodiversity conservation indicators

2.1. Indicators of forest ecosystem diversity.

2.2. Species diversity.

2.3. Genetic diversity of species.

3. Indicators to assess and monitor the biodiversity at different spatial scales.

3.1. Structural indicators.

3.2. Composite indicators.

3.3. Functional performance.

4. Typological units for the integration of forest biodiversity.

5. Mapping of diversity of organisms.

6. GIS technology to assess structural forest biodiversity.

7. Evaluation of forest vegetation diversity by forest taxation data.

8. Developing internal guidelines of the business for the conservation of biological diversity during harvesting.

9. Organization and management of forest biodiversity monitoring.

METHODOLOGY

The syllabus will be implemented as:

- lectures, seminars, including interactive modes;
- case-study;
- field trips;
- Interim and final exam, tests.

DEVELOPMENT PLAN

Lectures, including interactive	Practical classes, including interactive	Students independent work	Exam
8 hrs.	16 hrs.	165 hrs.	27 hrs.

EVALUATION

By the end of the course learners take an oral exam with evaluated with grade. Control of students' independent work is carried out with presentation of reports and abstracts on the topics of the course. Remaining knowledge of the course are checked after one year from the course deriod by written test.

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SYLLABUS TITLE:

Forest fires

State Agrarian University of Moldova

Authors

Gumaniuc Iachim

Sfecla Victor

Reviewers:

Alcázar Jorge, University of Lleida, Lleida (Spain)

Vega-Garcia Cristina, University of Lleida, Lleida (Spain)

SPECIALISED MODULE

FOREST FIRES

GENERAL INFORMATION

ECTS credits: 6

Total: 180 hours/24 class-room hours/4 themes

Lectures: 12 hours

Practical classes: 12 hours

Independent studies: 156 hours

Target group:

Entrepreneurs who want to gain more knowledge in a certain specialized subject

Modality:

a) Traditional instruction (face-to-face), conducted through lectures, practical and laboratory activities by using active and interactive methods of learning;

b) Independent learning for auditing students (by massive use of modern information and communication technologies, self-study learning);

c) Online collaborative learning

Starting date*:

01.09.2017

Language: English, Romanian, Russian

Address:

Forestry and Public Gardens Department, Faculty of Horticulture, State Agrarian University of Moldova; 44, Mircesti str., Chisinau, MD 2049, Republic of Moldova; phone: (+373 22) 432205, 432809; www.uasm.md

Teaching staff/coordinator:

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ADDITIONAL COURSE INFORMATION

Forest fires destroy countless millions of hectares every year.

It is estimated that climate change will cause an increase in frequency and magnitude of droughts, higher temperatures and strong winds. In these circumstances, the probability of fires and their severity will increase.

The current average annual area burned in the EU is 500 000 ha, with fires emitting tones of CO2, other GHG gases and particle matter. Every year in all the affected State -Members more than 50 000 forest fires take place. A forest fire is a destructive agent for both society and for the environment.

Forest fires are part of the natural dynamics of ecosystems regeneration. They facilitate the regeneration of certain plant species and maintain mosaics of open areas, semi-open and closed ones favourable for biodiversity.

However, when forest fires become too frequent, they may cause the homogenization of the environment and threaten rare or endemic species.

Forest fires destroy the seeds of plant species in the litter, reduce organic matter and initiate processes of erosion, conducing to site degradation.

Forest fires are also a major pollution factor, which varies greatly depending on the type of forest, type of fire and vegetation moisture content. A complete combustion causes serious health risks by producing smoke and harmful

gases such as carbon dioxide, carbon monoxide, methane, hydrocarbons, nitric oxide that lead to serious consequences for the local environment.

EU makes all the efforts to prevent forest fires; it focuses on training, research, raising awareness level and prevention. These efforts should be intensified under future conditions of climate change.

COMPETENCES

The learner should be exposed to the theoretical foundations of forest fires, the basic elements of the integrated approach to the problem of forest fires, the array of available measures to protect forests against fires, and the achievements of modern technologies in the detection and suppression of forest fires.

LEARNING OBJECTIVES

Acquiring the basic notions of forest fires, understanding the processes that determine triggering of forest fires and identifying opportunities for mitigation their effects.

LEARNING OUTCOMES

After completing this course you will be able to:

- understand the interdependence between the natural elements and their role in starting and propagating forest fires;
- identify the conditions in which forest fires are produced;
- adapt strategies and solutions for monitoring, prevention and fighting forest fires;
- identify methods of forecasting the development of a forest fire, strategic techniques of fighting forest fires, select firefighting equipment, and devise ways to reduce forest fires damage.

CONTENT

3.1. Starting and spreading of forest fires

3.1.1. Flammability and combustibility of forests

3.1.2. Flames released during forest fires

3.1.3. Temperature, released heat and flame height in forest fires

3.1.4. The speed of forest fires spreading

3.1.4.1. Classification. Influencing factors

3.1.4.2. The speed of litter fire propagation

4.PREVENTION, DETECTION AND SUPPRESSION OF FOREST FIRES

4.1. Preventing forest fires

4.2. Detecting forest fires

4.2.1. Applying surveillance system

4.2.2. Detection by air and land patrols

4.2.3. Duties of firefighting management and control centre

4.3. Means used in fighting forest fires

4.3.1. Extinguishing substances

4.3.2. Tools, machinery and equipment used in fire extinguishing

4.4. Methods of extinguishing forest fires

4.4.1. Firefighting using earth

4.4.2. Firefighting using water

4.4.3. Firefighting using chemicals

4.4.4.Extinguishing fire by explosions

4.4.5. Extinguish fire by cross fire/BACKFIRE?

.4.6. Firefighting using airplanes and helicopters

4.4.7. Firefighting using "Smokejumpers"

4.5. Strategic principles in forest firefighting

4.5.1. Basic principles

4.5.2. The tactics of fighting litter fires

4.5.3. The tactics of fighting crown fires

4.5.4. The tactics of fighting underground fires

4.6. The structure framework of the intervention plan in case of forest fires

METHODOLOGY

a) Independent learning for auditing students (by massive use of modern information and communication technologies or self-study learning);

b) Traditional instruction (face-to-face), conducted through lectures, practical and laboratory hours by using active and interactive methods of learning;

c) Online collaborative learning

DEVELOPMENT PLAN

Lectures	Practical classes	Independent studies	Total
12 hrs.	12 hrs.	156 hrs.	180 hrs.

EVALUATION

Grading system and grading weight of lectures, seminars, report after laboratories based on the field inquiry, an essay and exam by the end of the course

REFERENCES

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Project number 543946-TEMPUS-1-2013-1-ES-TEMPUS-JPHES (2013-4563/001-001)

SYLLABUS TITLE:
FOREST MANAGEMENT

Moscow state forestry university

Authors

Malashin Alexey

Chumachenko Sergey

Reviewers:

Trishkin Maxim, University of Eastern Finland

SPECIALIZED MODULE

FOREST MANAGEMENT

GENERAL INFORMATION

ECTS credits: 6

Total: 216 hrs

Theoretical part: 35%

Practical part: 65%

Target group:

Specialists in forestry

Modality:

Traditional (face-to-face)

Starting date*:

01.09.2017

Language: Russian, English

Department/Faculty:

Forest management and Forest inventory, Information technology in the forest sector / Forestry

Address:

Russia, Moscow region, Mytischi-5, ul 1-ya Institutskaya, d. 1; phone: 8 (498) 687-36-62, Email: caf-itls@mgul.ac.ru

Teaching staff/coordinator:

Prof. Chumachenko S. I.

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ADDITIONAL COURSE INFORMATION

This course is recommended for teaching students of the direction 35.03.01. "Forestry work" mastered such disciplines as "Ecology", "Economics", "Forestry", "Biology"

COMPETENCES

As a result of the course the student should form the knowledge of the following competencies FSES IN "Forest engineering" (undergraduate level):

1. ability to use basic laws of natural-science disciplines in professional activity

2. ability to evaluate the impact of economic activities on forest and URBO - ecosystems, their productivity, sustainability, biodiversity, environmental, water-conservation, protective, sanitary-and-hygienic, improving and other useful functions of forests;

3. ability to develop and implement measures for continuous and sustainable multipurpose use of forests to meet the needs of society in forests and forest resources depending on the target purpose of forests and the functions they perform useful functions;

4. ability to use knowledge about the forests in order to plan and conduct forest management activities aimed at rational, long-lasting, sustainable use of forests, increase forest productivity, preserving environmental, watershed, soil protective, sanitary-and-hygienic, improving and other useful functions of forests;

5. ability to use the elements of economic analysis in the organization and conduct of practical activities, willingness to take moderate risk level.

LEARNING OBJECTIVES

Course on "Sustainable forestry development" reveals the value and importance of sustainable forest management, the development of principles and ways of transition to sustainable forest management with the by using positive practices.

LEARNING OUTCOMES

At the end of the course, students will be able to:

• assess the critical level of risk when performing forestry works;

• use knowledge of the nature of the forest planning forest management activities;

• explain the concept of sustainable forest management under the multiple-factor effect;

• use knowledge of the essence of a multi-purpose, continuous and sustainable forest use to meet the needs of society in forests and forest resources;

• use the indicators of sustainable forest management;

• explain the concept of "sustainable forest management" and risks during implementation;

• use knowledge of the state forest inventory, forest management, forest registry and state cadastral registration of forest land for the purposes of forestry;

• explain the significance of the study and assessment of forest resources;

• describe the criteria and indicators for sustainable forestry development of the Russian Federation;

• justify the use of protection, protection and reproduction of forests;

• perform economic analysis of forestry activities;

• use methods of assessing the quality and impact of work and ways of organizing work of a team of performers to enhance management efficiency.

CONTENT

1. The notion of resource and the forest service

1.1. The main approaches of the forest resources classification

1.2. Features of the forest services

2. Methods of forest management

2.1. The relevance of the system of sustainable forest management

2.2. The goal of sustainable forest management

2.3. The principles of sustainable forest management

2.4. Indicators of sustainable forest management

3. The concept of ecological-oriented forest management

3.1. The importance of ecological-oriented forest management

3.2. Characteristics of the ecological-oriented and economically-oriented types of forest management

3.3. The factors determining the ecological-oriented model of forest management

3.4. The structure of ecological-oriented forest management

4. Evaluation of resources and services of the forest

4.1. The main methods of market value of forest resources

4.2. Basic methods of assessment of non-market resources and services of the forest

5. Planning in ecological-oriented forest management

5.1. Features of the Directive and indicative planning

5.2.The role of long-term (perspective), medium-term and short-term (current) planning in the forest management

METHODOLOGY

The discipline provides that:

- lectures, seminars, including interactive lectures and lecture-presentation;
- solution to case study problems;
- outreach activities in forests;

- intermediate and final control of knowledge, testing.

DEVELOPMENT PLAN

Lectures	Seminars	Interactive classes	Field visits	Independent studies	Examination
8 hrs	6 hrs.	4 hrs.	6 hrs.	190 hrs.	2 hrs.

EVALUATION

At the end of the course, students protect the project on "Forest management" with a rating assessment. Control of independent work of students is carried out by verification of reports and abstracts on topics in the course. Residual knowledge for the course is verified after one year by written test.

REFERENCES

1. The forest code of the Russian Federation of 04.12.2006 200-FZ (as amended on 13.07.2015).
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15. National report of the Russian Federation on criteria and indicators for the conservation and sustainable management of temperate and boreal forests (Montreal process). Moscow: VNIILM, 2003. 84 p
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SYLLABUS TITLE:

FOREST AND PRODUCTION: SITE QUALITY AND FOREST GROWTH MODELLING (WOOD PRODUCTION INCLUDED BIOMASS FOR ENERGY, BEST MANAGEMENT PRACTICES)

St. Petersburg State Forest Technical University (SPbSFTU)

Authors

Alexeev Alexander

Dobrovolsky Alexander

Chubinsky Maxim

Reviewers:

Trishkin Maxim, University of Eastern Finland

SPECIALIZED MODULE

FOREST AND PRODUCTION: SITE QUALITY AND FOREST GROWTH MODELLING (WOOD PRODUCTION INCLUDED BIOMASS FOR ENERGY, BEST MANAGEMENT PRACTICES)

GENERAL INFORMATION

ECTS credits: 6

Total: 216 hrs

Theoretical part: 35%

Practical part: 65%

Target group:

MSc and Phd students

Modality:

Traditional (face-to-face)

Starting date:

01.09.2017

Language: English, Russian

Address: Institute of Forest and Nature Resources, St. Petersburg State Forest Technical University

Teaching staff/coordinator:

Chubinsky Maxim, St. Petersburg State Forest Technical University

Email: mchubinsky@gmail.com

ADDITIONAL COURSE INFORMATION

This module is part of a LLL curricula in sustainable forestry developed in the framework of TEMPUS Project “Support for vocational training in sustainable forestry (SUSFOR)”. Partners in project have developed an LLL curricula in sustainable forestry intended for different learners for whom the suggested

courses will be useful and interesting. The learner will be able to implement sustainable forestry practices through appropriate training and education programs of this modular curriculum.

COMPETENCES

Identifying, analysing, finding optimal solutions for sustainable forestry and advanced information on different type of forest.

LEARNING OBJECTIVES

Learning the advanced notions regarding the different kind of models and there use in forestry.

Understanding the role and the importance of modelling for sustainable forestry.

LEARNING OUTCOMES

Students must be able to analyse the processes occurring in the plantations of trees growth and differentiation, defining their natural and anthropogenic factors to predict the consequences of various options for the use of resources.

Students should be skilled in the use of system analysis methods and packages of special application to solve the problems of analysing the structure and dynamics of forest ecosystems, forest reproduction, optimization calculation of their use, the creation of conditions for multi sustainable consumption and continuous reproduction.

INTRODUCTION

The aim of the course is to teach students to modern methods of research and modelling of growth, structure and dynamics of forest stands, systematic study of forest ecosystem functioning processes and reproduction, management and multipurpose utilization of forest resources, to familiarize

them with the methods of multivariate statistics, system dynamics, synergy and optimization for solving problems sustainable forest management.

CONTENT

1. Simulation of growth processes in forest ecosystems and the analysis of sustainability of growth. The main types of growth curves, equilibrium analysis and sustainability
2. Simulation of the structure and dynamics of forest ecosystems, the analysis of equilibrium and stability of a global matter cycles. The method of phase portrait
3. Matrix models in forestry and their application for sustainable forest management

METHODOLOGY

The syllabus will be implemented as:

- lectures, seminars, including interactive modes;
- case-study;
- final project.

DEVELOPMENT PLAN

Lectures including interactive lectures	Practical classes, including interactive lectures	Independent work	Final paper (project)
12 hrs.	12 hrs.	176 hrs.	16 hrs.

EVALUATION

At the end of the course students presents final paper (a project). Control of independent work of students is carried out by evaluation of reports and papers on the topics of the course.

REFERENCES

1. Shilov I.A. Ecology: the textbook for students of biological and medical specialties universities. Ed. 6th, sr. M .: Higher School, 2009. 511 p.

2. Volkov V.N., Denisov A.A. Fundamentals of the theory of systems and system analysis: a tutorial. - SPb .: Publishing house of the Polytech. University Press, 2005. - 520 p.

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Project number 543946-TEMPUS-1-2013-1-ES-TEMPUS-JPHES (2013-4563/001-001)

SYLLABUS TITLE:
IT TECHNOLOGIES IN FORESTRY

Moscow State Forestry University

Authors

Chumachenko Sergey

Malashin Alexey

Reviewers:

Trishkin Maxim, University of Eastern Finland

SPECIALIZED MODULE

IT TECHNOLOGIES IN FORESTRY

GENERAL INFORMATION

ECTS credits: 6

Total: 216 hrs

Theoretical part: 65%

Practical part: 35%

Target group:

Specialists in forestry

Modality:

Traditional (face-to-face)

Starting date:

01.09.2017

Language: Russian, English

Department/Faculty:

Forest management and Forest inventory, Information technology in the forest sector / Forestry

Address:

Russia, Moscow region, Mytischi-5, ul 1-ya Institutskaya, d. 1; phone: 8 (498) 687-36-62, Email: caf-itls@mgul.ac.ru

Teaching staff/coordinator*:

Prof. Chumachenko S.I.

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ADDITIONAL COURSE INFORMATION

This course is recommended for teaching students of senior courses of the direction 35.03.01. "Forestry work" mastered such disciplines as "Ecology",

"Economics", "Forestry", Biology" , Informatics".

COMPETENCES

As a result of the course the student should form the knowledge of the following competencies "Forest engineering":

1. ability to solve typical problems of professional activities on the basis of information and bibliographic culture with the use of information and communication technologies and taking into account the basic requirements of information security;
2. ability to participate in project development activities and objects of forest and forestry taking into account specified technological and economic parameters with the use of new information technologies;
3. ability to develop and implement measures for continuous and sustainable multipurpose use of forests to meet the needs of society in forests and forest resources depending on the target purpose of forests and the functions they perform useful functions;
4. ability to use knowledge about the forests in order to plan and conduct forest management activities aimed at rational, long-lasting, sustainable use of forests, increase forest productivity, preserving environmental, watershed, soil protective, sanitary-and-hygienic, improving and other useful functions of forests
5. ability to use the elements of economic analysis in the organization and conduct of practical activities, willingness to take moderate risk level.

LEARNING OBJECTIVES

Goals of learning are the formation of students ' professional skills in the field of modern information and geoinformation technologies in forestry sector, information culture, focus on the creative and professional use of modern

achievements of computer technologies in their future professional activities, in the process of self-education and training.

LEARNING OUTCOMES

At the end of the course, students will be able to:

• assess the critical level of risk when performing forestry works;

• use the structure of information support of the forest industry;

• use knowledge of silvicultural treatment information, test areas with specific examples;

• identify and evaluate the factors that must be considered when laying plots to build tables of growth;

• use knowledge to use to build tables of growth with specific examples;

• use the knowledge about the major indicators influencing economic yield of wood resources of the forest for the setup calculation material-monetary estimation of forest clearings;

• use knowledge of working with the industry software the calculation of material and monetary assessment of sites for the processing of data with specific examples;

• use specialized industry software;

• use knowledge of the essence of a multi-purpose, continuous and sustainable forest use to meet the needs of society in forests and forest resources;

• use the indicators of sustainable forest management;

• explain the concept of "sustainable forest management" and risks during implementation;

• use knowledge of the state forest inventory, forest management, forest registry and state cadastral registration of forest land for the purposes of

forestry;

• perform economic analysis of forestry activities;

• use methods of assessing the quality and impact of work and ways of organizing work of a team of performers to enhance management efficiency.

CONTENT

1. The basic model of dynamics of multispecies uneven-aged forest stands
2. Bioecological bases of the model of dynamics of multispecies uneven-aged forest stands FORRUS-S
3. The main factors affecting the dynamics of forest indicators forest
4. The structure of the model FORRUS-S. Main components and their working principles
5. The model of natural development and exogenous influences. Modelling of processes of growth, death and regeneration of arboreal species
6. Input and output simulation data
7. Models of different methods of forest management. Development of scenarios simulation
8. Modelling economic aspects of forest management
9. Examples of computational experiments with the forest tracts of different forest areas and economic zones
10. Model as the main element of system of support of decision-making

METHODOLOGY

The discipline provides that:

- lectures, seminars, including interactive lectures and lecture-presentation;
- solution to case study problems;
- outreach activities in forests;
- intermediate and final control of knowledge, testing.

DEVELOPMENT PLAN

Lectures	Seminars	Interactive classes	Field visits	Independent studies	Examination
8 hrs	6 hrs.	4 hrs.	6 hrs.	190 hrs.	2 hrs.

EVALUATION

At the end of the course, students protect the project on "Sustainable forestry development" with a rating assessment. Control of independent work of students is carried out by verification of reports and abstracts on topics in the course. Residual knowledge for the course is verified through year written test.

REFERENCES

1. Hetemaki L., Nilsson S. and IUFRO. Information technology and the forest sector. IUFRO Headquarters, Vienna, Austria, 2005
2. Moiseev NA. Economics of forestry. M: MGUL, 2010, 383 pp.
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SYLLABUS TITLE:

MODERN REMOTE SENSING METHODS

St. Petersburg State Forest Technical University (SPbSFTU)

Authors

Alexeev Alexander

Dobrovolsky Alexander

Chubinsky Maxim

Reviewers:

Trishkin Maxim, University of Eastern Finland

SPECIALIZED MODULE

MODERN REMOTE SENSING METHODS

GENERAL INFORMATION

ECTS credits: 6

Total: 216 hrs

Theoretical part: 35%

Practical part: 65%

Target group:

MSc and Phd students

Modality:

Traditional (face-to-face)

Starting date*:

01.09.2017

Language: English, Russian

Address: Institute of Forest and Nature Resources, St. Petersburg State Forest Technical University

Teaching staff/coordinator:

Maxim Chubinsky, St. Petersburg State Forest Technical University

Email: mchubinsky@gmail.com

ADDITIONAL COURSE INFORMATION

This module is part of a LLL curricula in sustainable forestry developed in the framework of TEMPUS Project “Support for vocational training in sustainable forestry (SUSFOR)”. Partners in project have developed an LLL curricula in sustainable forestry intended for different learners for whom the suggested courses will be useful and interesting. The learner will be able to implement sustainable forestry practices through appropriate training and education

programs of this modular curriculum.

COMPETENCES

Identifying, analysing, finding optimal solutions for using the remote sensing methods for forest inventory and management

LEARNING OBJECTIVES

Goals of learning are the formation of students ' professional skills in the field of methods for forest inventory and management, focus on the creative and professional use of modern achievements of computer technologies in their future professional activities, in the process of self-education and training.

LEARNING OUTCOMES

After completing this course students will:

Know

- Methods of computer analysis and measuring decryption quantitative and qualitative indicators of recognizable objects;
- Key technologies of using remote survey materials and GIS in forest inventory, environmental protection and monitoring of its condition.

Be able to

- Use remote sensing materials;
- Create map and attribute database queries and to retrieve the required information in the form of matrices or tables descriptions.

Have skills:

- Analysis of databases in set of data about objects earth's landscape envelope;
- Analysis of the initial data using the methods of mathematical statistics and cartographic method of research.

INTRODUCTION

The aim of the course is to teach students a rapidly developing modern distance (aerospace) methods of collecting timely and accurate information about the natural and artificial objects, phenomena and processes in the Earth surface, as well as their relationships and the impact on the features of the functioning of forest ecosystems. Remote sensing methods are the basis of information support for operational and strategic planning for sustainable forest management, and evaluating the effectiveness of the planned measures.

Almost all the current problems of the forestry sector (leasing relations development, certification, protection of old-growth forests, illegal logging) require for their solution up-to-date and objective information on the forest, however the sources of adequate input data are lacking at the moment. Topographic maps, which are part of forest management plans are updated at least once in 10 years and contain almost inadequate information on forest characteristics, with a detailed map of scale 1: 100 000 and higher resolution are not for public use because of the secrecy. Forest inventory data in many areas of the country basically obsolete, as even during the Soviet era forest inventory conducted every 10 (20) years. Currently, in 70% of territories of Russia the forest inventory is outdated. Up-to-date forest inventory (if it was carried out recently) little information available to consumers - enterprises of forest industry, local authorities, scientific and environmental organizations. It is significant that even the forest management authorities may experience difficulties in obtaining forest inventory data (especially in electronic form).

The largest forest powers have come to identify the need of remote monitoring of forests recently. Russia's lag in this area - small and concerns mainly the state information policy. In Finland and Sweden throughout the country with

an average spatial resolution (10-30 m) is carried out every 5-10 at the expense of the state budget. The outcomes of processed data is effectively used in forest inventory, forest management planning and detection of illegal logging. Thus, the use of satellite imagery on annual basis Sweden (since 2000) has helped reduce the number of illegal logging from 10 to 2% (REF). The government not only financially supports the obtaining of remote sensing data, but also actively contributes to the implementation of modern remote sensing methods and GIS technologies in forestry, including training of professionals and forest owners.

The current "Instructions for the forest management in the forests of Russia" (1994) provides for the use of satellite images for a wide range of applications, especially when managing reserved forests of northern and eastern regions of Russia. In the years since the publication of this manual, it has increased significantly as the technical capabilities of the set of equipment, and the possibility of deciphering. Methodological approaches by domestic scientists (VI Dry, VM Zhirin et al.) On the use of satellite imagery in the forestry sector in recent years (due to lack of state orders for imagery), these works mainly not beyond the scientific and experimental. Changes have started since early 2005, when Federal Forestry Agency initiated the implementation of remote sensing techniques in the monitoring of illegal logging.

The transition of using remote sensing tools on a regular basis in Russian forests (both medium and high resolutions) will allow a new level of solving many of the problems in forestry. Among them:

* Control over the harvesting process (including the tackling of illegal logging);
* Identification and assessment of the impact of forest fires;
* Forest pest monitoring;

* Forest inventory

* Assessment of certified forest areas;

* Validation of reforestation practices.

It should be emphasized that the solution of all these tasks can be carried out independently at the federal, regional level and at the level of large forest leasing companies.

The essential components of the remote monitoring of forest systems (including monitoring of illegal logging) are:

- A system of ground stations receiving data covering the whole country;
- Licenses for the receiving of remote sensing data;
- Data processing centers and archiving;
- Specialized software for image processing software.

CONTENT

1. Creation of forest cartographic products based on remote shooting with the help of GIS technologies

2.Technology of using modern materials remote surveys and GIS for forest inventory, forestry and environmental protection

METHODOLOGY

The syllabus will be implemented as:

- lectures, seminars, including interactive modes;
- case-study;
- final project

DEVELOPMENT PLAN

Lectures, including interactive	Practical classes, including interactive	Students independent work	Final paper (project)

12 hrs.	12 hrs.	182 hrs.	10 hrs.

EVALUATION

At the end of the course students presents final paper (a project). Control of independent work of students is carried out by evaluation of reports and papers on the topics of the course.

REFERENCES

1. Aerospace methods in the protection of nature and forestry / Ed. Sukhikh V.I., Sinitsyna S.G., M .: Forest industry.1979 - 288 p.

2. Remote sensing in forestry / Danyulis E.P., Zhirin V.M., Sukhikh V.I., Elman R.I., M .: Agropromizdat, 1989 -223 p.

3. Remote sensing: a quantitative approach / Sh. M .Davis, D.A. Landgrebe, T.L. Phillips and others. Ed. F. Svejna and S. Davis. M.: Nedra, 1983. - 415 p.

4. Dmitriev I.D., Murakhtanov E.S., Sukhikh V.I. Forest aviation and aerial photography M .: Agropromizdat, 1989. - 366 p.

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SYLLABUS TITLE:
AGRO-FORESTRY SYSTEMS MANAGEMENT

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SPECIALIZED MODULE
AGRO-FORESTRY SYSTEMS MANAGEMENT

GENERAL INFORMATION

ECTS credits: 6

Total: 180 hours/24 class-room hours/3 themes

Lectures: 12 hours

Practical classes: 12 hours

Independent studies: 156 hours

Target group:

Entrepreneurs who want to gain more knowledge in a certain specialized subject

Modality:

Traditional instruction (face-to-face), conducted through lectures, practical and laboratory hours by using active and interactive methods of learning;

b) Independent learning for auditors (by massive use of modern information and communication technologies (self-study learning);

c) Online collaborative learning (online collaborative learning)

Starting date*:

01.09.2017

Language: Romanian, Russian, English

Address: Alecu Russo Balti State University, 38 Pushkin str., Balti, MD – 3121 vpritcan@yahoo.com; http://www.usarb.md

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ADDITIONAL COURSE INFORMATION

The course is aimed at learners who want to improve their knowledge and

experience in Agro-forestry systems management. The program is open for students of 1st and 2nd cycle in Forestry, Landscape Architecture, Agricultural and Environmental Sciences and other related scientific areas.

COMPETENCES

Identification, analysis, solution finding to the problems related to the management of agro-forestry systems.

LEARNING OBJECTIVES

Learning the basic concepts related to the management of agro-forestry systems.

Understanding the processes that determine the sustainable development of agro-forestry systems and possible care, improvement and management methods of agro-forestry systems during their development period.

LEARNING OUTCOMES

After completing this course you will be able to:

- know the characteristics of the main agro-forestry systems;
- understand the role of trees in agro-forestry systems and the need for protection forest belts;
- identify and analysed the behaviour and the evolution in time of some species of trees and shrubs in protection forest belts;
- recognize the priority parameters intended for protection forest belts placement;
- evaluate the development perspective of agro-forestry systems;
- apply the knowledge in promoting the management technologies of forest belts.

INTRODUCTION

The agro-forestry systems refer to widespread and extensively applied

practices in forestry. The presentation of the study "Trees, food and people" by J.B Bene, H.W. Beall and A. Cote from 1977, (cited by Mihăilă Elena et. al, 2012) served as a great impulse to the development of this science. They laid the stress on the importance of the research for improving the agro-forestry systems. As a first and immediate result of the debate on this study was the establishment of the International Research of Agro-forestry Systems (ICRAF), with localization in Nairobi, Kenya.

The agro-forestry systems comprise all land use systems in which forest species are deliberately maintained or introduced into agricultural or zootechnical production in order to benefit from the interaction of environmental and economic outcome. It is a broad concept that includes all forms of association between trees and/or shrubs, on the one hand, and agricultural crops and/or animals, on the other hand. The agro-forestry systems integrate trees with various crops and/or animals having as a main objective the reduction of the possibility of certain risks (desertification, land degradation etc.) and the increasing of total production. The (foreseeable) augmentation of the production is a major objective of rural development, but it is not a single expected benefit of agro-forestry systems.

In our country, the term agro-forestry systems represent a new concept or it is often used with a partial and inconclusive meaning, although there existed an association of trees and / or shrubs with agricultural crops, pastures and animals that has been practiced for a long time in different ways, combining components from different disciplines (forestry and agriculture). There is an outlined interdisciplinary field, equally divided by foresters and agriculturists. Thus, the agro-forestry systems must be each time analysed from two points of view. The main purpose of setting up such systems is

getting a more diversified, qualitative, and supplementary production, ensuring high environmental and economic stability. Simultaneously, the importance of agro-forestry systems increases on account of the climate changes and ecosystem degradation. They ensure the long-term augmentation of environmental quality and natural resource conservation. As for short-term intensification, the agro-forestry systems can support the ecosystem balance and functionality, increase their diversity, reduce greenhouse gas (through carbon storage) and have favourable socio-economic effects (ensuring job places, qualitative and varied products, etc.).

In current circumstances, there are no measures undertaken concerning agro-forestry systems towards insuring their stability, specialization and productivity. Agro-forestry systems should replace the systems undergoing degradation, instability and those from drought and aridity affected areas. The integration of trees into farming systems ensures a more efficient light, water and nutrients use, as compared to pure agricultural crops. Although other countries experience concerning the adoption of the systems, cannot be a priori accepted and the benefits obtained through association with forest cultures and farming are obvious, it can constitute at least an impulse in application of certain types of agro-forestry systems in our country.

CONTENT

1. Possibilities of combining the forest vegetation with agricultural and/or livestock crops
2. Characteristics of the main agro-forestry systems
3. The agrotechnics of protection forest belts

METHODOLOGY

The syllabus will be implemented as:

- lectures, seminars, including interactive modes;
- case-study;
- exam.

DEVELOPMENT PLAN

Lectures including interactive lectures	Practical classes, including interactive lectures	Independent studies
12 hrs.	12 hrs.	156 hrs.

EVALUATION

By the end of the course the learners will passes a written exam. A certificate of attendance will be awarded.

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