Transilvania University of Braşov, Romania

Study program: Forest Ecosystem Management

Faculty: Silviculture and Forest Engineering
Study period: 2 years (master)

1st Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Complex Watershed Management	ACBH	7	2	-	2	-

Course description (Syllabus): A methodological approach regarding the research of hydrological role of the forest in watershed complex management context. On a wider scale about the forest role in preventing and controlling the torrential flows from small, predominantly forested, watersheds. Hydrological classification of the lands from small, predominantly forested, watersheds. Estimating and mapping the torrential flow risk in the case of small watersheds, predominantly forested. Hydrological and erosion processes mathematical modelling and simulation. Expert systems. Models classification. The Revised Universal Soil Loss Equation (RUSLE) adapted for applications in forested watersheds from Romania. Distributed and semi-distributed hydrological models (ANSWERS, KINEROS, TOPMODEL). WEPP Model. General structure and main components. GIS applications in hydrology. The digital isochrones method. Degraded Lands Reclamation Works System (structure, components). Technical solutions design and execution. Field case studies in a complex situation, an area affected by severe pollution, soil erosion and landslides (Copşa Mică).

Course title	Code	No. of credits	Number of hours/week			
			course	seminar	laboratory	project
Forest and Environmental Regulations	REF	6	1	2		

Course description (Syllabus): The legal status of the States Member of the EU Prerequisites for the establishment of the EU; The Establishment of the EU. The EU Institutions; Legal force of the regulatory acts applicable at national level. Categories of acts; The significance of "*sustainable*" attribute in the forest and environmental regulations; About the forest property. The private forest ownership specifics in Romania; Relationships between the forestry regulations and the environmental regulations; Knowledge about the main U.E. regulations and the main National regulations, in the field of Forestry and Environment, respectivly.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Integrated Management of Forest Pests	MIDF	7	2	-	2	-

Course description (Syllabus): Integrated pest management of spruce stands. Pests in spruce forests and their management. Windfalls - *Ips typographus* - *Heterobasidion annosum*: old problems in a new context. Biotic factors affecting stability of spruce stands installed outside the natural area (*Pristiphora abietina, Ips duplicatus*). Harmful biotic factors of beech. Introduction. Pest insects on leaves (*Phyllaphis fagi, Typhlocyba cruenta, Diurnea fagella*), between the bark and wood (*Ernoporus fagi, Taphrorychus bicolor, Agrilus viridis*) and on bark (*Cryptococcus fagisuga*). Phytopathogenic fungi of beech (*Nectria coccinea*).Pest insects involved in the dieback of pines. Introduction. Pest insects on needles (*Leucaspis* scales, *Dynaspidiotus abietis, Schizolachnus pineti, Calomicrus pinicola, Brachonyx pineti, Brachyderes incanus*) and between the bark and wood (*Rhagium inquisitor, Pissodes castaneus, Phaenops cyanea*). Mite pests of forest species. What are mites? Brief characterization of the order *Acari* and the family *Eriophyidae*. Mites on leaves of *Fagus, Tilia, Acer* and *Carpinus*.Useful mites?. Biodiversity. Deadwood – importance for biodiversity. What is biodiversity? Biodiversity in Romania. Importance of deadwood in forest.

Course title	Code	No. of credits	Number of hours per week			
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Advanced GIS Techniques and Concepts	CTAG	6	1	-	2	-

Course description (Syllabus): Basic concepts which operate a geographic information system to use it in the context of applications for management of forest resources. Models used in internal representation of the digital maps in raster and vector format. Technology of creating digital cartographic database. Using the GIS databases in specific projects.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Ethics and Academic Integrity	EIA	2	1	-	-	-

Course description (Syllabus): Morality – values and principles; Academic community and its fundamentals; Fundamentals of merit, professionalism, responsibility, respect, honesty, transparency and tolerance; Fundamentals of data privacy, non-discrimination and equal opportunities; Reactions of the academic community to the violation of its values.

Course title	Code	No. of credits	Number of hours per week			
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Forest Policy and Strategy	PSF	2	1	-	-	-

Course description (Syllabus): Policy and strategy in forestry: definition, history, evolution; The development of policy and forest strategy; Policy and forestry development strategy in Romania: evolution, structure, implementation; European forestry strategy: steps, structure, implementation; European forestry directives application, environmental protection and rural development with an impact on forestry; Forestry relations with other sectors.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Complex Applications of Mathematical Statistics in Silviculture	ACSM	7	1	-	3	-

Course description (Syllabus): Analysis of variance and covariance; Principal component analysis; Sampling designs; Point pattern analysis (pair-correlation function, Ripley function, marked-correlation function); Index based on distance between nearest neighbour (mingling index, differentiation index and contagion index).

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Ecology and Sociology of Indicator Plant Species	ECPI	6	1	-	2	-

Course description (Syllabus): Principles and methods of bio-indicators. Quantifying the indicator values of species. Ecological species groups. Ecograms. Vegetation survey and classification. Diagnostic species for vegetation types. Methods of multivariate analysis in vegetation science: cluster analysis, ordination (DCA, CCA, NMDS), species distribution models.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Management and Entrepreneurship in Silviculture	MAS	6	1	-	1	-

Course description (Syllabus): The basis of the entrepreneurial process; Entrepreneurship in the forestry sector in Romania; Business plan - analysis of the business environment, general business strategies; Accounting elements for entrepreneurs; Cost-benefit analysis - the present value of future cash flows; Financial management of start-up companies.

Course title	Code	No. of credits	Number of hours per week			
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Forest Management Certification	CERTPAD	6	1	-	1	-

Course description (Syllabus): Forest management certification: definitions, origins, organization, development, benefits; Forest management certification systems; Main certification schemes used in Europe: FSC and PEFC; Custody certification chain: definition, standards and procedures; Forest management certification and custody chain - national and international level.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Informational System in Forestry	SINFS	5	1	-	1	-

Course description (Syllabus): The specific workflow of the programs used in the forestry sector. Building and analyzing the databases. Creating attribute tables. Methods to link databases and maps.

2nd Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Global Climate Changes and Their Consequences	MCGCA	3	1	-	-	-

Course description (Syllabus): The Global Climate System. Climate Genetic Factors. Climate conditions analysis at various space and time scales. Climate Changes Natural Causes. Climate Research Methods. Information Sources: Proxy Data. Climate changes in geological and historical prospective. Human Influence on Climate. Greenhouse Effect Enhancement. Emissions Scenarios. Global Climate Models. Models Classification and Evolution. Climate Change Simulation Experiments using GCM-s. Global Climate Change Scenarios and Possible Consequences. Climate Change Impacts on Forest Ecosystems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Forest Microclimatology	MF	3	1	-	-	-

Course description (Syllabus): Climate-vegetation interactions analysis at global and regional level. Climate classification systems. Climate data reanalysis. Global climate databases. Energy transfer in the boundary layer. Radiation fluxes in forest ecosystems. Mass transfers in the boundary layer. Forest vegetation evapo-transpiration estimation methods. Momentum transfers in the boundary layer. Wind-forest interactions. Landforms effect on climate. The mountain climates. Forest phenology elements. Observation networks. Phenology space pattern in hilly and mountain areas.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Forest Tree Breeding	SPMAA	7	2	-	1	-

Course description (Syllabus): The concept of tree breeding strategy; The scientific basis for organization and deployment of breeding programs; Tree breeding methods; Possible and applied biotechnology in forest tree breeding.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Conservation of Forest Genetic Resources	RGF	7	2	-	1	-

Course description (Syllabus): History and phylogeny of the main forest tree species from Romania; Geographic and ecotypic variation in the main forest tree species from Romania; Gene conservation – in situ and ex situ; Conservation of forest genetic resources in Romania.

Course title	Code	No. of credits	Number of hours per week			
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Special Silviculture	SILVSPEC	7	1	-	3	-

Course description (Syllabus): Main silvicultural issues (e.g., regeneration methods, tending operations and silvicultural systems) related to the main forest types and tree species of Romania. Silvicultural issues in relation to pure stands (including Norway spruce, silver fir, European larch, Scots pine, Black pine, European beech, sessile oak, pedunculate oak, Hungarian oak, Turkey oak, black locust, hybrid poplars, etc.), mixed stands (European beech-Norway spruce-silver fir, mixed broadleaves with oak as dominant species) as well as important tree species (e.g., wild service tree, common ash, sycamore, wild cherry).

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Forest Ecosystem Dynamics	DINECOS	7	1	-	3	-

Course description (Syllabus): Disturbances (background, classification, dynamics and role in the evolution of forest ecosystems); Forest successions (background, definitions, types, role and evolution); Models – modelling and their use in the dynamics of forest ecosystems; Applications of forest dynamics in Silviculture.

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			course	seminar	laboratory	project
Agro-Forestry Systems	SAPFP	6	1	-	2	

Course description (Syllabus): Agro-forestry systems – concepts and historical use; Biological and ecological fundamentals of agro-forestry systems; Classification of agro-forestry systems; Forest shelterbelts – functions and characteristics; Establishment of forest shelterbelts. Assessing the impact. Planning the afforestation design and species composition.

Course title	Code	No. of credits	Number of hours per week			
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Ecophysiology	ECOFIZ	6	1	-	2	-

Course description (Syllabus): Generally aspects; Woody plants growth as an ecophysiological process; Photoregulation of physiological processes; Thermoregulation of physiological processes; Mineral nutrition and physiological processes; Woody plants relations with water and their ecophysiological implications; CO_2, regulation factor of physiological processes of trees; Physiological processes adjustment under O_2 influence; Biomass and bioenergy production at trees and stands; Ecophysiological bases of decisions in silviculture.

Course title	Code	No. of credits	Number of hours per week			
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Wild Life Evaluation and Conservation	ECFS	7	2	-	2	-

Course description (Syllabus): Wildlife research methods. The science and the management of wildlife; The animal population – structures, functions and dynamics; Methods to evaluate wildlife populations. Applied indices; Factors influencing the wildlife management.

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National Forest Inventory and Monitoring	MINF	7	2	-	2	-

Course description (Syllabus): This course aims to make known networks monitoring the health of forests and national forest inventory. Topics covered in this course include: Monitoring network, network monitoring the health of forest ecosystems level I; Methodology for long term monitoring of the condition of forest ecosystems under the influence of air pollution and climate change in the long term research network (level II); Monitoring of forest growth in the network of national forest inventory.