



## **“FOREST RESTORATION” SYLLABUS**

<b>Basic data of the subject</b>	
<b>Academic Unit:</b>	<b>Life and Environmental Sciences Faculty</b>
<b>Course title:</b>	<b>Forest revitalization</b>
<b>Program:</b>	<b>Forestry and Environmental Sciences</b>
<b>Level:</b>	<b>Bachelor</b>
<b>Course status:</b>	<b>Compulsory</b>
<b>Study year:</b>	<b>Third year, first semester</b>
<b>Number of hours per week:</b>	<b>3+2</b>
<b>Credit value – ECTS:</b>	<b>6</b>
<b>Time / location:</b>	<b>To be announced</b>
<b>Lecturer:</b>	<b>Prof. Asoc .Dr. Mirvjena Kellezi</b>
<b>Contact details:</b>	<b>mirvjena.kortoci@uni-prizren.com</b>
<b>Course description:</b>	<p>This course will introduce the students to the basic principles of the object, purpose and destination of forestation. Degradation and causes of forest degradation. Revitalization of forests (why, where, how to revitalize the forests). Revitalizing ecological functions. Revitalizing socio-economic values. Restoring the landscape to the previous forest state. Recognition of the forestation object environment. Criteria that are followed for the recognition of the environment. Fruit and forest seeds collection. Maturity time and seed collection time. Selection of forest stands and trees, tree plantations. Collection technique. Extracting seeds from cones and fruits. Extraction of pine seeds using artificial heat. Seed preservation methods. Seed transportation rules.</p> <p>Quantitative and qualitative indicators of forest seeds and their designation methods. Seeds preparation for sowing. Preparation methods.</p> <p>Forest nurseries. Types of forest nurseries and their organization. Choosing the nursery place. The order of planting the crops and the technical and organizational plan of the forest nursery. Land processing and maintenance in nurseries.</p> <p>Seedlings production by seeds. Asexual (vegetative) production of forest saplings. Harvesting planting material in nurseries.</p> <p>Artificial reforestation techniques. Possible areas for reforestation. Reforestation methods: seedling seedlings, saplings, cuttings and mixed.</p> <p>Tilth methods and soil preparation in forestation. Soil preparation and improvement. Precautions for soil preparation and improvement. Methods and time of soil preparation.</p> <p>Mixing species and planting cultures in forestation. Forestation schemes and formulas.</p>



	<p>Afforestation by seeds. Means and planting times: with spreading, in rows, and pits.          Revitalization after disturbances (after fires, storms, risk from invasive-alien species management, erosion control, forest restoration in abandoned areas). Implementation of forest legislation.          Revitalization of different types of forests.</p>		
<b>Course objectives:</b>	<p>The main objective of this subject is to provide students with basic knowledge on forest revitalization. Environment recognition and choice of suitable species in artificial afforestations. Collection and storage methods, laboratory tests of forest seeds. Technical and economic procedures for the construction and operation of forest nurseries. Seed preparation procedures and seedling production techniques in forest nurseries. Working and soil preparation systems, fertilization and irrigation in forest nurseries. Generative and vegetative multiplication of forest species in nursery. Cultivation of forest species in greenhouses and covered roots (containers). Methods and time of soil preparation in artificial afforestation. Methods of mixing and placing forest species in the forestation areas (formulas and schemes).          Methods and techniques of artificial afforestation by seed and seedlings. Labor mechanisms.          Work evaluation methods in afforestation and their study.          This is foreseen to be linked to practical experience in forest ecosystems in Kosovo in selected degraded forests but also in conserved forest areas.</p>		
<b>Learning outcomes:</b>	<p>After completing this module, students should be able to:</p> <ol style="list-style-type: none"> <li>1. Identify the purpose and destination of revitalization interventions.</li> <li>2. Explain the degradation and the importance of forest revitalization.</li> <li>3. Select suitable species for afforestation.</li> <li>4. Analyze forest fruits and seeds suitable for collection.</li> <li>5. Experiment the right ways to store forest seeds.</li> <li>6. Organize and manage forest nurseries.</li> <li>7. Plan the appropriate measures in the revitalization after forest disturbances and develop them in practice.</li> </ol>		
<b>Contribution on student load (must correspond with learning outcomes)</b>			
<b>Activity</b>	<b>Hours</b>	<b>Days/week</b>	<b>Total</b>
Lectures	3	13	39
Exercise theoretical/laboratory	2	5	10
Practice work	2	7	14
Contact with lecturer/consultations	2	15	30



Field exercises	2	3	6
Mid-terms, seminars	2	2	4
Homework	-	-	-
Individual time spent studying (at the library or home)	2	15	30
Final preparation for the exam	1	10	10
Time spent in evaluation (tests, quiz, final exam)	1	5	5
Projects, presentations, etc.	2	1	2
<b>Total</b>			<b>150 hours (6 ECTS)</b>
<b>Teaching methods :</b>	Lectures, discussions, laboratory exercises, outdoor research exercises, consultations, independent projects, homework assignments, colloquia, seminars. Assessments (I & II), exams.		
<b>Evaluation methods:</b>	First assessment: 10%, Second assessment: 10%, Seminars or other engagements: 20%, Final exam: 60%, Total: 100%.		
<b>Literature</b>			
<b>Basic Literature:</b>	<p>Tabaku, V. (2015): Silvicultura speciale. Leksione te shkruara per studentet.</p> <p>Treska .LL. Pyllzimet.</p> <p>Kortoçi, Y., Kellezi, M. (2012): Shfrytezimi i pyjeve te ahut te Shqiperise me nje silvikulture te qendrushme.</p> <p>Kellezi, M., Kortoci, Y. (2013): "L'impiego delle coltivazioni arboree a rapida crescita per produrre energia verde:metodi colturali raccolta e impieghi".</p> <p>Elliott, S. D., D. Blakesley and K. Hardwick (2013): Restoring Tropical Forests: a practical guide. Royal Botanic Gardens, Kew; 344 pp.</p>		
<b>Additional Literature:</b>	<p>Tabaku, V. (2015): Silvicultura Speciale. Leksione te shkruara per studentet.</p> <p>Marku, V.(2014): Dendrologjia.</p>		

<b>Designed study plan:</b>		
<b>Week</b>	<b>Lectures</b>	<b>Exercises</b>
<i>First week:</i>	Introduction. Forests and their importance. What is revitalization? Definitions. Object, purpose and destination of afforestation and reforestation. Forest	Practice on forests and their importance. The concept of revitalization, environment recognition for afforestation and the species selection in areas with different ecological conditions.

	<p>species reproduction. Possibilities of forest creation: the bases of artificial forests cultivation, forestation on bare grasslands, beneath the main canopy, etc.</p> <p>Recognizing the environment in the reforestation area. Criteria that are followed for environmental recognition. Climate study, solar radiation, drought occurrence, soil study for species selection, etc.</p>	
<i>Second week:</i>	<p>Species selection in reforestation process. Importance and criteria to be followed. Domestic, foreign and pioneer (preparatory) species. The method of comparative ecology, forestry typology and experimentation.</p> <p>Fruits and forest seeds collection. Seeds harvest and collection time. Selection of forest and tree species, seed plantations. Collection technique.</p>	<p>Practice on degradation, deforestation and measuring degradation or various indicators to suggest that a forest is degraded. The ways of forests seeds collection and foreseeing the production of seeds from forest trees and stands.</p>
<i>Third week:</i>	<p>Seeds extraction from the cones and fruits. Extraction of pines seeds by artificial heat (cone dryers). Extraction of seed of coniferous species that require special treatment. Preparation of seed samples for laboratory analysis on quantitative and qualitative seed indicators.</p>	<p>Practice on methods of laboratory determination of quantitative and qualitative indicators of forest seeds.</p>
<i>Fourth week:</i>	<p>Preservation of forest seeds. Seed preservation methods: dry, regular, well-regulated storage and airtight containers. Keeping in the wet environment. Seed transport rules.</p> <p>Quantitative Quality parameters of forest seeds and</p>	<p>Practice on forest nurseries and ways of forest seeds treatment before planting them in the nursery.</p>

	<p>methods for their evaluation. Determination of germination ability: laboratory cultivation, biochemical and X-ray methods.</p>	
<i>Fifth week:</i>	<p>Seeds preparation for sowing. Preparation methods: bedding, cold bedding, hydrothermal and chemical treatment, microelement processing, (disinfection and pre-germination). Forest nurseries. Types of forest nurseries and their organization. Choosing the nursery place. The order of planting the crops and the technical and organizational plan of the forest nursery.</p>	<p>Practice on construction problems, use of mechanisms and other equipment in forest nurseries.</p>
<i>Sixth week:</i>	<p>Land processing and maintenance in nurseries. Soil tith systems, herbicides, fertilizer, fertilizer types. Land preparation for planting in nurseries. Seedlings production by seeds. Seed planting methods. Depth and planting time. Hand and mechanized planting. Herbal care work.</p>	<p>Practical on soil preparation problems, fertilization and technique of irrigation in forest nurseries.</p>
<i>Seventh week:</i>	<p>Production of seedlings in closed environments (solar and artificial greenhouses). Production of rooted seedlings covered in plastic bags, turfed vases, cardboard vases, containers. The transfer of seedlings to nurseries. Purpose and methods of seedlings transplanting. Care services</p>	<p>Nursery practice on generative and vegetative multiplication of forest species (in-vitro, grafting, cuttings, etc.).</p>
<i>Eighth week:</i>	<p>Asexual (vegetative) production of forest saplings. Vegetative multiplication with 2-year cuttings, green cuttings, hardwood cuttings, air layering, grafting.</p>	<p>Seminar 1: Chapters on forest seeds, their quantitative and qualitative indicators and production of forest seedlings in forest nurseries.</p>

	Harvesting planting material in nurseries (calculation of planting material): seedlings inventory.	
<i>Ninth week:</i>	Approaches at the site level (micro-level). Preconditions. Species selection. Advices for planting trees. What it means to restore the forest in its entirety. Interventions for the biodiversity restoration. Passive restoration. Enrichment plantings. Direct seeding. Scattered tree plantings. Close-spaced plantings. Close-spaced planting using different species. Intensive ecological reconstruction after mining. Directing ecological successions. Distance from intact forests. Wildlife. Ecological surprises. Interventions providing biodiversity and productivity. Managing secondary forests. Agroforestry. Monoculture plantations.	Practice on interventions on smaller or larger surfaces. Ecosystems that can regenerate themselves or not and establishment of conditions for succession occurrence. Clarification of the terms "restoration", "rehabilitation" and "recuperation". Community decision-making on revitalization issues.
<i>Tenth week:</i>	Mixing species and planting cultures in reforestation. Reforestation schemes and formulas. Placement of species in a disorderly and orderly manner. The density of species in forests. Reforestation by seeds. Means and planting times: with spreading, in rows, and pits. Coverage depth and seed rates.	Practical advices on tree planting. The right elements to maintain a healthy restoration. Passive restoration that can be achieved simply by protecting the site from further disturbances and allowing natural colonization. Different ways of human intervention to aid restoration. Subsidies for tree plantations.
<i>Eleventh week:</i>	Reforestation by seedlings. Planting material and its preparation. Time and method of seedlings plantation: by hand or mechanized means. Depth and planting technique. Care work on forest plants after forestation. Importance	Field practice on afforestation methods by seedlings.

	and types of cultural care. Time to complete them.	
<i>Twelfth week:</i>	Measuring and controlling work in new reforestations. Seedling survival rate verification and survey of new reforestations. Methods of studying forest plants. Sample plots determination. Special reforestation cases. Forest shelterbelts. Classification of shelterbelts: according to material, function, density and structure. Species that are used, cultivation techniques and services.	Practice on artificial afforestation directly by seeds (preliminary work on the area to be planted, preliminary seed treatment. Seed planting ways and techniques).
<i>Thirteenth week:</i>	Basins and landslides afforestation. Afforestation of coastal sandpits and river shingle. Choosing and placing species. Plantation and cultural care.	Practice on the right moments when and where to intervene? Recognizing the pre-existing situation and the current situation. Ecological factors such as river stabilization or erosion. Socio-economic factors such as the choice of the most suitable areas for intervention based on the available finances.
<i>Fourteenth week:</i>	Afforestation on mountain pastures. Sowing technique and after-plantation care services. Afforestation on motorways and urban forests. Species selection and afforestation techniques. Services.	Seminar 2: Forest nurseries and artificial reforestation.
<i>Fifteenth week:</i>	Forest landscape revitalization after fires. Revitalization of forests after violent storms. Managing the risk of invasive alien species in restoration. Erosion control. Restoring forests after land abandonment.	Concrete examples and demonstrations of various revitalization cases such as after fires, after heavy storms. Invasive species risk management. Erosion control. Restoration of forests in abandoned lands.
<b>Academic policies and rules of conduct:</b>		
Students are obliged to attend regular lectures, participate in field visits (excursion). Disconnection of mobile phones, timely access to the classroom and keeping quiet in the lesson are also mandatory.		