| Basic data of the subject | |
|---|---|
| **Academic Unit:** | **University of Prizren „ Ukshin Hoti”<br>Faculty of Life and Environmental Science<br>Direction: Forestry and Environmental Sciences** |
| **Department:** | **Forestry and environmental sciences** |
| **Program:** | **Forestry and environmental sciences** |
| **Course title:** | **Silviculture 1** |
| **Level:** | **Bachelor** |
| **Course status:** | **Compulsory** |
| **Study year:** | **Second year, first semester** |
| **Number of hours per week:** | **3+2** |
| **Credit value – ECTS:** | **6** |
| **Time / location:** | |
| **Lecturer:** | **Prof.Aoc.Dr. Mirvjena Kellezi** |
| **Contact details:** | **mkellezi@ubt.edu.al** |
| | |
| **Course description** | Silviculture in the forest science system: Silviculture and hunting, nature conservation, exploitation, forestry and land science.<br>The role and importance of forests globally. Physical-geographic role of forests (the edaphic, geomorphologic, climatic and hydrological role). Anthropic-geographical role of forests (role as a producer of raw materials). The impact of forests on agricultural crops and livestock, hygienic and aesthetic role of forests. The risks of forest ecosystems in the world today.<br>Forest Biology (Silvo-biology). General knowledge on the forest. The forest as a complex livelihood (forest ecosystem). Trees as characteristic of forest stands. Differences between the lonely trees and those grown in the forest stands.<br>Main characteristics of forest ecosystems and their constituent elements. The forest stands (woodlands) as the main layer of the forest. Other forest layers (under woodland, seedling and herbaceous layers. Structural features of the forest stand.<br>Tree growth classification in forest stands by (KRAFT's and IUFRO's classification). Production's and quality classes of forest stands.<br>Forest and the environment relationship. General knowledge on forest ecology. Groups of ecological |

| | |
|---|---|
| | factors, the mechanism of their influence in the life of the forest and possibilities of changing them. Forest vegetation and climate factors. Atmospheric chemical elements as ecological factor.<br><br>Light as ecological factor in the forest life. General knowledge on the light. The impact of light on trees and forests existence. The impact of forest on the light. Silvicultural conclusions regarding the light.<br><br>Heat as an ecological factor in the life of the forest. Heat impact on the trees and forests existence. Forest influence on the heat and heat management possibilities through silvicultural measures. Silvicultural conclusions regarding the heat.<br><br>Humidity as ecological factor in the forest life. The influence of moisture in the trees and forests existence. Elements of moisture regime, characterizing the vegetation conditions. Forest impact of on the humidity. Silvicultural conclusions regarding moisture.<br><br>The forest and the atmosphere movements as ecological factor. Wind impact in the existence of trees and forests. Physiological and mechanical action of the wind. Wind management possibilities through silvicultural measures. Forest impact on the wind. The forest and the atmospheric electricity. The joint action of climatic factors.<br><br>Forest vegetation and edaphic factors. Soil chemical properties as ecological factor. The impact of soil in the existence of the forest trees. Forest soils moisture, air and heat regime. Influence of forest on the soil.<br><br>Forest vegetation and topographic factors (altitude, slope and exposition). Forest vegetation and biotic factors. Plant and animal biotic factors (the role of herbaceous and under-woodland coverage in the life of the forest. The role of fauna in forest life. Human role in the forest life. The importance of ecological knowledge.<br><br>Biology of forest trees. Vegetative functions and their phenological stages. Tree growth (height, diameter and the volume growth). Stages of development of trees and forest stands.<br><br>Knowledge on forest stands. Formation conditions in nature of simple or mixed stands. Advantages |

| | |
|---|---|
| | and disadvantages of simple or mixed stands. The composition, structure and development of forest stands.<br><br>Forest Evolution and its succession laws. Cultural, economic value and importance of the knowledge and direction of successions.<br><br>Role and tasks of applied silviculture. Role and contribution of applied silviculture in intensifying forest stands productivity. Purposes and methods of silvicultural planning.<br><br>Structure and regeneration of virgin forests. Differences between virgin forests and managed forests. Study methods in virgin forests and natural forest reserves. The theory of natural stages of development in forest stands.<br><br>Cultural cuttings in the forest stands. Theoretical bases, tasks and goals, work methods and economic evaluation. Seedlings and new forest stand care. Cultural cuttings and their classification. Economic and biological premises of cultural cuttings.<br><br>Liberation and cleaning cuttings in forest stands. Silvicultural general purposes, technical implementation and periodicity of liberation and cleanings cuttings.<br><br>Thinning of the first and second level. General silvicultural purposes, technical implementation and periodicity of thinning. Distribution of trees in the framework of thinning.<br><br>Various methods for implementing of cultural cuttings. Liberation cuttings and cleanings performing methods. Classical methods of implementation of thinning (thinning from below, from above, combined and choice thinning. New methods of thinning (plenter thinning, with limit diameter, thinning in groups, geometric thinning in forest plantations).<br><br>Implementation of cultural cutting in main forest formations (black pine, beech , fir, spruce and the mixed forests of beech with spruce, oaks, poplar woods and forest formations with protective functions or other special functions.<br><br>Other taking care cuttings in the forest stands. |

| | |
|---|---|
| | Formative pruning and branch removal. Sanitary cuttings. Tools and techniques for their realization.<br><br>Forest stands governance forms and treatment types. Governance as high forest. (generative and vegetative forest renewal). Renewal on bare land. Treatment with clear cutting in large and small area. Treatment main features, silvicultural objectives, ecological and silvicultural assessment. Advantages and disadvantages of clear cutting treatment.<br><br>Treatment with uniform successive cuttings. Characteristics, objectives, treatment performance and its ecological assessment. Advantages and disadvantages of uniform successive cuttings treatment.<br><br>Treatment with non-uniform successive cuttings (progressive or with gaps). Characteristics, objectives, performance of treatment and its ecological assessment. Positive and negative side non-uniform successive cuttings treatment.<br><br>Treatment with successive uniform cuttings in the edge of forest massive. Purpose and renewal techniques and its eco-silvicultural evaluation. Positive and negative sides of this treatment.<br><br>Other forest stands treatment types. Treatment with continuous cutting and treatment with diameter limit cutting. Silvicultural evaluation of these treatments types.<br><br>Medium forest and high forest governance. Forms and types of renewal in the lower oak forests. Vegetative renewal of the forest. Secondary (mixed) forest. Transformation of low and medium forest in the high forest (conversion).<br><br>Governance forms and types of treatments in the main forest formations in our country (in black pine forests, fir, beech, oak, poplar woods, etc., as well as forest formations with protective functions and other special functions.<br><br>New concepts in sustainable forest governance. Silviculture close to nature. The concept of "Ecological Forest Exploitation". Silviculture and "Forest certification". |
| **Course objectives:** | Ecological factors affecting the life of the forest and |

| | |
|---|---|
| | their modification possibilities with silvicultural measures.<br><br>Forest biology (Silvo-biology). General knowledge on the forest. Main features of forest ecosystems. Differences between the lonely trees and those grown in the forest stands.<br><br>Evolution and succession forest laws. Importance of the knowledge and direction of successions.<br><br>Distribution of vegetation in the world and forest classification systems. Phyto-climatic zones and main forest formations of our country according to the Phyto-climatic zones.<br><br>Cultural cuttings in the forest stands and their economic and biological premises.<br><br>Main implementation methods of the cultural cutting and their concrete application in the main forest formations in our country.<br><br>Principal governance forms and treatments types and their application in the main forest formations in our country.<br><br>New concepts in sustainable forest governance. Silviculture close to nature. The concept of "Ecological Forest Exploitation" and "Forest certification" |
| **Learning outcomes:** | After finishing this course the students should be abble to:<br>1. Recognise the ecological and biological factors and interfere in the forest with different silvicultural measures.<br>2. To develop knowledge on sucsession and evolution laws of the forest vegetation and their management possibilities.<br>3. To distinguish the phytoclimatic zones and main forest formation of the country according the phytoclimatic zones.<br>4. To create an idea about the main implementation methods of the care works in main forest formation of the country.<br>5. To know the main governance forms and most important treatments type of the forest stands and implementation in the forest. |
| | |

| Contribution on student load (must correspond with learning outcomes) | | | |
|---|---|---|---|
| **Activity** | **Hours** | **Days/week** | **Total** |
| Lectures | 3 | 15 | 45 |
| Exercise theoretical/laboratory | 2 | 15 | 30 |
| Practice work | | | |
| Contact with lecturer/consultations | 8/semester | - | 8 |
| Field exercises | | | |
| Mid-terms, seminars | 2/semester | - | 2 |
| Homework | 6/semester | - | 6 |
| Individual time spent studying (at the library or home) | 4 | 15 | 70 |
| Final preparation for the exam | 6/semester | - | 6 |
| Time spent in evaluation (tests, quiz, final exam) | 6/semester | - | 6 |
| Projects, presentations, etc. | 7/semester | - | 7 |
| **Total** | | | 180 hours |

| | |
|---|---|
| **Teaching methods** | Lectures, discussions, laboratory exercises, expeditions consultations, seminars, independent projects, homework assignments, colloquium, course assignments, exams. |
| **Evaluation methods** | First assessment (colloquium): 10%,<br>Second assessment (colloquium): 10%,<br>Seminars or other engagements: 10%,<br>Final exam: 70%,<br>Total: 100%. |
| **Literature** | |
| **Basic Literature:** | Tabaku, V. (2015): Bazat e Silvikultures. Leksione te shkruara per studentet.<br>Kortoçi,Y.,Kellezi, M. (2012):Shfrytezimi i pyjeve te ahut te Shqiperise me nje silvikulture te qendrueshme. |
| **Additional Literature:** | Mine, V.,Postoli, A., Tabaku, V. (2002): Rrallimet tregtare ne grumbujt pyjore. Tiranë.<br>Marku, V. (2014): Dendrologjia<br>Treska, Ll., Xheko, B. (1982): Silvikultura I, II<br>Balla, R., Dermani, V., Karadumi, S. (1987): Pyllezimet artificiale. Volumi I dhe II.<br>Veshi, L., Spaho, Sh. (1974): Pedologjia mbi bazat e gjeologjise<br>Grazhdani, S. (2003): Agrometeorologjia. Botim i UBT<br>Ralph D. Nyland: Silviculture: Concepts and Applications, 2007. |

| | |
|---|---|
| **Designed study plan:** | |
| **Week** | **Lectures which will be held** |
| ***First week:*** | Object and purpose of silviculture as science. Development history and evolution of silviculture in the world. Tasks and objectives of silvicultural activities in the current conditions of our country.<br>The role and importance of forests globally. Physical and geographical role of forests (edaphic role, geomorphologic role, climatic and hydrological role). Anthropo-geographical role of forests (role as a producer of raw materials). The impact of forests on agricultural crops and livestock, hygienic and aesthetic role of forests. The risks of forest ecosystems in the world today.<br>Forest Biology (Silvobiology). General knowledge on the forest. Forest as a set of complex living (forest ecosystem). Trees as characteristic of forest stands. Differences between the lonely trees and those grown in the forest stands. |
| ***Second week:*** | Main characteristics of forest ecosystems and their constituent elements. The forest stands (woodlands) as the main layer of the forest. Other forest layers (under woodland, seedling and herbaceous layers. Structural features of the forest stand.<br>Classification of trees growth in forest stands (KRAFT's and IU FRO's classification). Production's and quality classes of forest stands. |
| ***Third week:*** | Relations between the forest and the environment. General knowledge on forest ecology. Groups of ecological factors, the mechanism of their influence in the life of the forest & possibilities of modifying them.<br>Forest vegetation and climate factors. Atmospheric chemical elements as ecological factor. Light and heat as an ecological factor in the life of the forest. Their impact in the existence of trees and forests. Influence of the forest on the heat and light. Silvicultural conclusions regarding the heat and light.<br>Humidity and wind as ecological factor in the life of the forest. Their influence in the existence of trees and forests. The possibilities of modification through silvicultural measures. The impact of forest on the humidity and wind. Silvicultural conclusions regarding the humidity and wind. |
| ***Fourth week:*** | Forest vegetation and edaphic factors. Chemical properties of the soil as ecological factor. The impact of soil in the existence of the forest trees. Moisture, air and heat regime of the forest soils. Influence of forest on the soil. Silvicultural conclusions regarding the soil. |

| | |
|---|---|
| | Forest vegetation and topographic factors (altitude, slope and exposition). Forest vegetation and biotic factors. Plant and animal biotic factors (the role of herbaceous and under-woodland coverage in the life of the forest. The role of fauna in forest life. The role of man in the forest life. The importance of ecological knowledge. |
| ***Fifth week:*** | Biology of forest trees. Vegetative functions/ phenological stages. Tree growth (height, diameter and the volume growth). Stages of development of trees and forest stands.<br>Knowledge on forest stands. Conditions of formation of simple or mixed stands in the nature. Advantages and disadvantages of simple or mixed stands. The composition, structure & development of forest stands.<br>Evolution of the forest and its succession laws. Cultural and economic value and importance of the knowledge and direction of successions. |
| ***Sixth week:*** | Distribution of vegetation in the world and forest classification systems. Distribution of vegetation in Kosovo. Phytoclimatic zones and main forest formations of our country according Phytoclimatic zones. General knowledge on forest typology.<br>Role and contribution of applied silviculture. Contribution of applied silviculture in intensifying of productivity of forest stands. Purposes and methods of silvicultural planning. |
| ***Seventh week:*** | Structure and regeneration of virgin forests. Differences between the virgin forests and the managed forests. Methods of study in virgin forests and natural forest reserves. The theory of natural stages of development in forest stands.<br>Cultural cuttings in the forest stands. Theoretical bases, tasks and goals, work methods and economic evaluation. Seedlings and the new forest stand care. Cultural cuttings and their classification. Economic and biological premises of cultural cuttings.<br>Liberation cuttings and cleanings in forest stands. Silvicultural general purposes, technical implementation and periodicity of liberation cuttings and cleanings. |
| ***Eighth week:*** | Thinning of the first and second level. General silvicultural purposes, technical implementation and periodicity of thinnings. Classification of trees in the framework of thinning.<br>Various methods for implementing of cultural cuttings. Performing methods of liberation cuttings and cleanings. Classical methods thinning implementation (thinning from below, from above, combined and the thinning with choice. New methods of thinning (plenter thinning, with limit diameter, thinning in groups, geometric thinning in forest |

| | |
|---|---|
| | plantations). |
| | **First intermediate evaluation** |
| ***Ninth week:*** | Implementation of cultural cutting in main forest formations ( in the forests of black pine, beech , fir, spruce and the mixed forests of beech with spruce, oaks, poplar woods and in forest formations with protective functions or other special functions. Other taking care cuttings in the forest stands. Formative pruning and branch removal. Sanitary cuttings. Tools and techniques for their realization.<br>Government forms & forest stands treatment types. Forest governance as high forest. (generative & vegetative renewal of forest). Treatment with clear cutting in large & small area. Advantages and disadvantages of clear cutting treatment.<br>Uniform successive cuttings treatment. Characteristics, objectives, performance of treatment and ecological assessment. Advantages and disadvantages of uniform successive cuttings treatment. |
| ***Tenth week:*** | Non-uniform successive cuttings treatment (progressive or with gaps). Characteristics, objectives, performance of treatment and ecological assessment. Advantages and disadvantages of non-uniform successive cuttings treatment.<br>Successive uniform cuttings treatment in the edge of forest massive. Purpose and renewal techniques and eco-silvicultural evaluation. Advantages and disadvantages of treatment. |
| ***Eleventh week:*** | Other treatment types of forest stands. Continuous cutting treatment and limit diameter cutting. Treatment. Silvicultural evaluation of these treatments types.<br>Government as medium and high forest. Forms and types of renewal in the lower oak forests. Vegetative renewal of the forest. Secondary (mixed) forest. Transformation of low and medium forest in the high forest (conversion).<br>Treatment of simple coppice and coppice with standards. The implementation techniques. |
| ***Twelfth week:*** | Treatment of plenter coppice. The implementation techniques<br>Regime of composed coppice (generative and vegetative regeneration) |
| ***Thirteenth week:*** | Forests vegetative and generative regeneration. Medium forest.<br>Cutting from above treatment. Cutting in stocking.<br>Conversion. Methods and means of conversion implementation. Conversion with natural and artificial regeneration. |
| ***Fourteenth week:*** | Cultural and economic importance of natural and artificial regeneration. Treatment choice. |

| | |
|---|---|
| | Governance forms and treatment types in the main forest formations in our country. |
| ***Fifteenth week:*** | New concepts in sustainable forest governance. Silviculture close to nature.<br>The concept of "Ecological Forest Utilization". Silviculture and "Forest certification". |
| | **Second intermediate evaluation** |

| **Academic policies and rules of conduct:** |
|---|
| Regular and active participation of students in lectures, exercises (practical part) and in seminar work.<br>Keeping quiet in lecture, disabling mobile phones, timely access to the classroom, etc. |

## Exercises

| **Designed study plan:** | |
|---|---|
| **Week** | **Exercises which will be held** |
| ***First week:*** | Field demonstrations of prescribing methods of forest stands. |
| ***Second week:*** | Field trip on the description of the structural features of forest stands: origin, composition, crown density, horizontal and vertical structure. |
| ***Third week:*** | Field trip on classification of tree growth according KRAFT and IUFRO. Production and quality classes determination methods. |
| ***Fourth week:*** | Field trip on natural stages of forest stands development determination. |
| ***Fifth week:*** | Demonstrations and discussions on the advantages and disadvantages of mixed and simple forest stands. |
| ***Sixth week:*** | Field trip about description of forest formations and phyto-climatic zones. |
| ***Seventh week:*** | Methodology demonstrations in forest typological studies. |
| ***Eighth week:*** | Seminar 1: Importance and main functions of forests for the society and the main environmental factors that affect the forest. |
| ***Ninth week:*** | Concrete details and practical illustrations in field about the tools and technical implementation of liberation cuttings and cleaning in forests stands. |
| ***Tenth week:*** | Field practical demonstration on the tools and technical application of thinning in forest stands. Thinning from above and from below. |
| ***Eleventh week:*** | Practical demonstration on uniform successive cuts |

| | |
|---|---|
| | implementation. |
| ***Twelfth week:*** | Practical demonstration on non-uniform successive cuts implementation. |
| ***Thirteenth week:*** | Practical demonstrations on tree marking in forest stands. Silvicultural aspects. |
| ***Fourteenth week:*** | Low forest treatments and regimes implementation (coppice regime). |
| ***Fifteenth week:*** | Seminar 2: Government forms, types and treatments of cultural cuttings in the forest stands. |