

# Courses Description

## 1<sup>st</sup> SEMESTER

### Compulsory courses

#### **111. Wildlife biology**

Basic elements of morphology, anatomy and physiology of birds, mammals, freshwater fish, amphibians and reptiles. Geographical distribution, habitat, reproduction, food habits and behavior of species occurring in Greece (with an emphasis on mammals and birds). The course includes the identification of different species, with an emphasis on those that have an economic importance for humans. Upon successful completion of the course, students will be capable to:

- identify wildlife species found in Greece
- use biological data processing methodologies in order to compile ecological and environmental studies
- collaborate with fellow students in order to create and present a framework of an ecological study which, during their work as future Foresters, may be part of a management plan for an ecological, environmental or another relevant study

#### **112. Plant morphology and physiology**

Morphology and physiology of plant organisms with emphasis on forest species. Basic definitions and general concepts of cytology, histology, organography, nutrition, respiration, growth and plant ecology.

#### **113. Meteorology - Climatology**

Basic concepts of meteorology and climatology. Atmosphere. Solar radiation. Air and ground temperature. Atmospheric pressure, Winds, air masses. Atmospheric water, precipitation. Other atmospheric phenomena. Classification of climates. Weather stations, instruments, observations. Climatic data, climatic and bioclimatic indicators, numerical expressions, graphs of climatic and bioclimatic parameters.

#### **114. Geology - Mineralogy - Petrography**

Geology: structure and composition of the earth's interior. Geological cycles and geological time. Endogenous and exogenous forces. Geological data of Greece, study of geological maps.

Mineralogy: crystallographic elements, physical properties and systematic classification of minerals. Identification of most important minerals in hand specimen.

Petrography: formation, properties and classification of igneous, sedimentary and metamorphic rocks. Identification of most important rocks in hand specimen. Use of the petrographic microscope for the identification of minerals and rocks.

Upon successful completion of the course the student will be able to study and analyze problems related to the geology, minerals and rocks in order to contribute to the design and management of projects.**115.**

#### **115 Mathematics**

Functions, Graphs, Roots, Monotony, Extremes, Limits. Function Derivatives. Function Integrals. Tables, Table Transactions, Invert Tables. Equation systems. Determinants. Vectors, vector operations. Elements of analytical geometry.

Upon successful completion of the course the student will be able to understand and apply:

- Concepts related to functions.
- the monotony and extremes of functions. Be able to graph functions and understand transcendental functions.
- the distinction of sequences as well as series.
- the derivation and completion of functions.
- tables, tables operations and how they are used in programming
- the study and solution of differential equations.

### **116. General ecology**

Object: fundamental concepts and principles of ecology. Biodiversity. Abiotic factors. Biocommunity. Autoecology (definitions, relationships between living beings and environmental factors). Ecology of populations (definitions, characteristics of populations, mechanisms of population regulation). Ecology (Ecosystem definition, analysis of ecosystem structure and operation. Factors affecting the operation and stability of ecosystems). Ecosystem level organization (energy flow, limiting factors, chemical circulation, ecosystem behavior over time). Upon successful completion of the course, students acquire, on the one hand, general knowledge of general ecology and, on the other hand, special knowledge regarding the characteristics and organization of populations, their relationships, food chains and pyramids, communities and basic characteristics. The main goal is to understand the relationships between them, their interactions and the importance of proper and sustainable management of ecosystems and their components for the health of the natural environment and all their living components.

### **117. English terminology**

Revision of English Grammar and structure, English terminology related to forestry and environmental studies, scientific article and research paper analysis, Academic speech development, Academic writing.

## **2<sup>nd</sup> SEMESTER**

### **Compulsory courses**

#### **211. Biometry**

Compilation, analysis and presentation of statistical datasets. Statistics of location (arithmetic mean, median, mode, quadratic mean) and dispersion (standard deviation, variation, coefficient of variation) Measures of skewness and kurtosis. Probability distributions. Poisson, Binomial, Bernoulli, t-distribution, chi-square, normal distribution, standard normal distribution. Confidence intervals, statistical testing, Correlation coefficient, Linear Regression and Sampling methods.

Learning Outcomes: Students will gain a basic understanding in

- defining terms used in statistics
- estimating measures of central tendency and dispersion
- interpreting theoretical probability distributions
- develop linear regression analysis

- setting statistical tests.

## **212. Forest Botany (Systematic)**

General concepts and definitions. Different classification systems of plant species. Description and classification of plant species. Floral diagrams and floral types. Diagnostic features of the main families of forest ecosystems in Greece. Family-level identification, using keys and stereoscopes.

## **213. Forest Soil Science**

Formation and evolution of forest soils, physical, chemical and biological properties, nutrient cycling, soil - forest relations, soil hydrological cycle relations, soil sampling and soil analysis, soil taxonomy.

## **214. Technical Drawing**

This course provides the reader with the main knowledge to be able to draw projects application from work and reinforcement details as well as reading them easily while implementing. Starting from building elements is fundamental to have a good command of reading and drawing complex projects.

A technical drawing is used to convey information about an object. A common use is to specify the geometry necessary for the construction of a component and is called a detail drawing. Usually, a number of drawings are necessary to completely specify even a simple component. The drawings are linked together by a master drawing or assembly drawing which gives the drawing numbers of the subsequent detailed components and quantities.

## **215. Hydrology**

Definitions, concepts of general hydrology. Water and planet earth. Global freshwater reserves and their distribution, water balance, hydrological cycle and role of forest vegetation. Hydrometeorological factors. Evaporation, transpiration, infiltration, groundwater, springs and source categories, runoff, flood flows - discharges, rainfall-runoff models. Forest vegetation and hydrological factors. Water quality, forest vegetation and water quality. Basic concepts in water resources management, water legislation.

## **216. Environmental Chemistry**

Introductory concepts in Chemistry. Chemical processes in the atmosphere, hydrosphere and soil surface. Study of the concentrations, distribution and movement of chemical elements in the earth and the laws that determine this distribution. Study and interpretation of geochemical cycles. Effects on the natural environment, contribution of geochemistry to the detection of pollution. Types of pollutants, study of their sources and their effects on the natural environment. Atmospheric pollution: Sulfur dioxide, nitrogen oxides, carbon monoxide, car exhaust, smoke fog, photochemical cloud, ozone, hydrocarbons, particulate matter, acid rain, heavy rain, etc. Hydrosphere and soil pollution: Dissolved oxygen, biochemically required oxygen (BOD), chemically required oxygen (COD), total organic carbon (TOC), anaerobic degradation of organic compounds in natural waters, nitrogen compounds, detergents, nitrogen. Heavy metals, pesticides, organochlorinated insecticides, herbicides, polychlorinated biphenyls, polycyclic aromatic hydrocarbons. Liquid waste, solid waste. Environmental protection measures. Upon successful completion of the course the student is able to study and analyze problems related to environmental pollution, to evaluate them, to contribute in studies, relevant to the protection of natural environment, and their application.

## **217. English terminology**

Revision of English Grammar and structure, English terminology related to forestry and environmental studies, scientific article and research paper analysis, Academic speech development, Academic writing.

## **3<sup>rd</sup> SEMESTER**

### **Compulsory courses**

#### **311. Forest mensuration**

Definitions and content of forest mensuration. Definitions about tree diameters and tree height. Measurements and mathematical approaches for estimating standing and timber volume. Estimation of tree age. Estimation and prediction of stand and forest volume, growth and yield. Development of volume tables and introduction to sampling techniques.

Learning Outcomes: Students will gain a basic understanding in

- estimating the quantity of wood products
- estimating linear dimensions of trees
- applying appropriate mathematical formulae to predict standing volume
- using scientific instruments for recording basic dendrometric characteristics
- designing a forest inventory plan.

#### **312. Geographic Information Systems - Environmental**

Introduction to Geographic Information Systems, definition of a geographical problem. Database models. Digital mapping, cartographic projections. Space analysis. Decision making and exploring alternatives solutions. Geographic Information System Organization. Digitization steps and error correction. Pre-analytical procedures. Decision-making. Cartographic rendering of information.

Upon successful completion of the course the student will be able to:

- uses Geographic Information Systems effectively to record Geographic Information, such as, forest inventory, mapping of burned or trampled areas, delimitation of sensitive areas and location of game shelters
- to plan the analysis of forest and environmental problems using Geographic Information Systems
- make decision based on the results of the analysis and present the results in the form of maps and diagrams, independently or in the context of a comprehensive study.

#### **313. Forest Botany (Trees & Shrubs)**

Morphological diagnostic features, general description, biological requirements, geographical distribution of forest trees and shrubs in Greece, and important, from a forestry point of view, alien forest trees. Species and subspecies identification using keys and stereoscopes. Identification of forestry species in the field.

#### **314. Harvesting of Forest Products**

Preparation and organization of logging and harvesting of wood, resin and other forest products. Methods used and harvesting tools (tools, machinery, animals, etc.). Peculiarities of harvest conditions in Greek forests. Harvesting systems in relation to topographical conditions. Principles, methods and systems for the displacement and longevity of wood. Modern mechanical means of shifting and transporting wood (ground, air and water transport). Displacement and transport of wood with tractors (simple and articulated). Economic aspects of harvesting forest products. Analysis of work phases, staffing, training, accidents. Means, tasks, systems, workflow and organization of forest product harvesting. Demonstration of logging and harvesting work in forest stands in the area. Formation,

classification and distribution of forest products. Harvesting of resin. Harvesting of forest products and environment.

Upon successful completion of the course the student will be able to:

Knows the methods of harvesting forest products

Organize a specific harvest of forest products mainly wood but also other forest products

Has the skills to respond to future research or professional activities.

### **315. Topography**

#### **Surveying and Measurements**

Surveying is all about measurements, and these skills are very important for those working in forestry and natural resources. While it involves a great deal of math, it is applied math, with clear formulas available to use for most procedures. This manual will focus on topics that are relevant to skills needed by professionals in the forestry and natural resources fields.

Forest Surveying and Measurements is an introduction to the theory and practice of surveying methods and measurements as applied to the specifics of forestry problems and their solutions. This course provides fundamental instruction for surveying and field measurements. Also, intends to prepare forest engineering students for Forest Route Surveying, Control Surveying and Property Surveying.

### **316. English terminology**

Revision of English Grammar and structure, English terminology related to forestry and environmental studies, scientific article and research paper analysis, Academic speech development, Academic writing.

### **Elective courses**

#### **321. Fertility of forest soils**

Factors affecting soil fertility and plant growth. Clay minerals and soil fertility. Assessment of soil fertility. Nutrients and nutrition of plants. Improving soil fertility - fertilizers. Application of fertilization in forestry and consequences. Upon successful completion of the course, students acquire, on the one hand, general knowledge of forest soil fertility and, on the other hand, special knowledge regarding nutrients, their concentration, the problems created in plant nutrition by their presence in high or low concentrations. , fertilizers as well as forestry measures to be taken for proper, sustainable management. The main goal is to understand the relationships between them, their interactions and the importance of proper and sustainable management of forest ecosystems and their components for the health of the natural environment and all their living components.

#### **322. Freshwater fish farming**

General physicochemical properties of inland waters, external morphology of fish. Anatomy and elements of physiology. Zoogeographical distribution and migration of fish. Ichthyological zones of flowing waters. Fisheries Biology and Fish Population Dynamics. Reproduction. Age and growth, height-weight ratios, robustness index and specific growth rate. Dietary habits and diet of fish. Methods for estimating fish populations. Inland fisheries management (rivers, lakes and coastal lakes). Upon successful completion of the course the student will be able to:

- has knowledge of fish and fish farming,

Uses methodologies for processing biological and growth data, fish nutrition and fisheries management for ecological and environmental studies

- collaborates with his / her fellow students to create and present a blueprint for an ecological study which, in the future in the course of his work as a Forester, will be part of a blueprint for an ecological, environmental, management or other related study

### **323. Informatics -Applications in Forestry Science**

Computer software for use in forestry science. Word processing, Spreadsheets, Presentations, Databases, Mathematical software. Software for smart devices used in forestry (measuring distances, angles and area, measuring the height of trees and structures, measuring slopes of land and forest roads, geolocation, recording coordinates, uses in the Forest and National Land Registry). Remote storage, file sharing. Data Security.

The main goal is the understanding of the new Information and Communication Technologies by the undergraduate student, so that with the acquired knowledge they can contribute as future Foresters in the protection and improvement of the environment with green technologies (Green Informatics), in Sustainable Environmental Governance, and Sustainability and Integrated Development. Through Green Informatics, the knowledge of Green Practices and Green Behavior can ultimately contribute to the protection and restoration of the natural environment.

### **324. Soil mechanics**

Soil formation and nature, their analysis and classification. Active and neutral voltage - permeability and filtration. Trend distribution. Active trend. Contact pressure and voltage distribution. Soil compaction in the field. Shear strength of soil. Critical state theory. Mohr circles. Ground thrusts. Bearing capacity of soil. External loads. Soil deformations. Sediments. Slope stability. Geotechnical Eurocodes. Shallow foundations. Ground thrusts and support structures. Upon successful completion of the course the student will be able to:

- has understood knowledge about the properties and behavior of soils in relation to structures.
- uses soil control methodologies for the preparation of technical and forestry studies,
- collaborates with his / her fellow students to create and present a blueprint for a technical study which, in the future in the course of his work as a Forester, will be part of a blueprint for a forestry or other related study.

## **4<sup>th</sup> SEMESTER**

### **Compulsory courses**

#### **411. Forest Economics**

Basic economic concepts. Market structure, demand, supply, elasticities, principle of economy, productivity. Introduction to Forest Economics. Economics of forest production rates. Supply and demand of forest products, forest holdings. Marketing of forest products. Social and economic planning in forestry, forest enterprise management planning. Macroeconomic and microeconomic analysis in forest holdings. International trade. Upon successful completion of the course the student will be able to:

- understand basic concepts of economic theory, inputs and outputs of economic operation and their application in forest production
- estimate the cost of forest production and analyze the value chain of forest products

- estimate the value of forest holdings
- assess the value of forest-related services.

#### **412. Wood Structure and Properties**

Macroscopic features. Natural characteristics. Microscopic structure. Chemical composition and microstructure of wood. Wood production mechanism. Normal structure variability. Defects of wood structure. Natural wood properties, wood density, wood moisture viscosity, wood shrinkage and swelling, wood strength, mechanical, thermal, acoustic and electrical properties of wood. Damage to wood. Natural durability of wood. Characteristics and identification of basic wood species, methods and techniques of macroscopic and microscopic identification of wood species and structural errors.

Upon successful completion of the course the student will be able to:

- Knows wood as a material
- Recognize the different types of wood
- Has the skills to respond to future research or professional activities.

#### **413. Ecotourism - Forest Recreation**

Ecotourism. Concepts and definitions. Forms of ecotourism at the global and European level. Forest recreation. Forest Tourism. Natural leisure resources. Needs and demand for leisure. Natural optical resources. Forestry species in the landscape. Natural and man-made landscapes. Forest recreation projects and facilities: routes (sidewalks - paths - roads), recreation areas, camps, landscape enjoyment projects - sightseeing sites, environmental education projects. Recreational forest management - Operation. Upon successful completion of the course the student will be able to:

- has understood the methodology of installation of forest recreation areas and the organization of ecotourism.
- uses data processing methodologies related to ecotourism and forest recreation for the preparation of forest, ecological and environmental studies,
- collaborates with his / her classmates to create and present a plan-framework of a forest recreation study which in the future in the course of his work as a Forester will be part of a study-plan for an ecological, environmental, management or other related study.

#### **414. Environmental geomorphology**

Introductory concepts: geomorphology and environmental geomorphology. Methods and techniques of geomorphological research. Characteristics of geomorphs and their evolution. Protected geomorphological formations - monuments nature. Weathering, erosion, denudation. Configuration and mobility of slopes and landforms. Landslide phenomena: landslides, creeps, subsidence. Hydrogeomorphological problems of hydrographic networks, morphometry. Geomorphs originating or affected by anthropogenic activity, artificial geomorphs, hydrogeomorphological processes. The effect of anthropogenic interventions on the dynamics of geomorphological processes, river basins and estuary regions of rivers and streams. Anthropogenic interventions and their impact on geomorphological processes.

#### **415. Forest Botany (Geobotany)**

Phytogeography, endemic species, species distribution, history of forest vegetation, vegetation zones. General principles of phytosociology, forest vegetation classification, ecology, habitat types. Implementation to the field by taking sampling plots, analysis and classification of vegetation units.

## **416. English terminology**

Revision of English Grammar and structure, English terminology related to forestry and environmental studies, scientific article and research paper analysis, Academic speech development, Academic writing.

## **Elective courses**

### **421. Climate Change and Forest Ecosystems**

Concepts of climate change and climate variability. Climate history of the Earth. Causes of climate change. Scenarios of greenhouse gas emissions and their effects on the global climate system. Land use changes and climate change. Evolution of forest ecosystems and climate variability. Impacts of climate change on forest ecosystems. Adaptation of forest ecosystems to climate change. International Conventions on climate change. The Intergovernmental Panel on Climate Change (IPCC). National Strategy and Targets for Climate Change Adaptation.

### **422. Sampling Techniques**

Basic concepts, characteristics, procedure, sampling framework. Data collection methods. Sampling methods: simple random sampling. stratified random sampling. systematic sampling, unequal probability sampling, multistage sampling, sampling in successive cases. Sample size. At the end of the course the students will be able to:

- Recognize the appropriate sampling method for solving specific problems in forestry practice.
- Calculate appraisers, standard errors and confidence intervals based on the sampling plan.
- It minimizes sampling errors.

### **423. Physical Geography**

Introductory concepts of earth evolution. Morphogenetic and continental geophysical movements (orogenesis). Volcanoes. Endogenous geomorphological processes and faults, folds. Exogenous geomorphological processes. Decomposition-Corrosion-Deposition processes. Geomorphological effects of water and currents, sedimentogenesis, valleys, steps, development stages and karst geomorphology. Chemical and mechanical action of water on carbonate rocks. Karst forms (Dolines, Ovals, Polges). Geomorphological action of wind-sand dunes, wind erosion. Glaciers. Oceanographic elements. Coasts, sea (currents, waves). Coastal geomorphology. Lakes, Lagoons, Swamps. Classification of the main forms of the earth relief. Illustration of the earth surface. River geography.

Students completing this course will be able to describe the various components and processes of the planet, the correlations between the various parameters, their variability in space and time and based on all the above, to explain the distribution of different ecosystems of the planet. During the course, students will learn how to analyze variables and interpret their spatial distribution on maps. This approach allows students to understand the natural processes of the earth and the local characteristics of its zones and processes from an applied perspective.

### **424. Forest Ergology (Forest Ergonomics)**

Basic concepts, definitions. The role of the human factor in work. Basic concepts of business system construction. Basic principles of organization of work systems. Elements of working physiology. Elements of psychology and sociology of forest work. Environmental factors of forest work. Preparation and configuration of work systems. Time studies and calculation of

forestry remuneration. Safety and hygiene at work. Performance safety and accident prevention. Forestry work organization, the case of Greece.

Upon successful completion of the course the student will be able to:

- Organize business systems and stages of forest work with simultaneous implementation of occupational health and safety
- Uses data processing methodologies for compiling time studies and calculating forestry fees
- Has the skills to respond to future research or professional activities.

## **5<sup>th</sup> SEMESTER**

### **Compulsory courses**

#### **511. Forest Ecology**

Definition of the term "forest ecosystem". Auto-ecology (interactions between forest ecosystem and environmental factors). Syn-ecology (structure and function of forest ecosystem). The ecology of forest growth.

#### **512. Forest Road Engineering and Management**

Forest road engineering and management including the location, surveying, design, cost estimation, and construction practices for forest roads. Lecture on principles, and laboratory field practice in locating, surveying, designing, and cost estimating.

Furthermore, give emphasis on structural design of culverts, aggregate testing and evaluation, environmental assessment of forest road systems, road maintenance cycles and management.

#### **OBJECTIVES**

To provide a geographically diverse source of expertise for forest road engineering, and through research and extension to help develop solutions that satisfy operational demands and that satisfy societal and environmental expectations.

#### **513. Remote sensing**

Introductory concepts. Remote sensing systems. Instruments and materials for aerial photography. Awnings for aerial photography. Photographic system. Aerial photography design. Geometry of aerial photography. Types of aerial photographs. Characteristics of aerial photography. Distortion - Shift. Stereoscopy. Stereoscopic observation. Placement of aerial photographs and stereoscopes suitable for stereoscopic observation. Problems and rules that affect stereoscopic observation and study of aerial photographs. Comparison of map and aerial photography. Stereoscopic parallax. Measurement of height of objects, altitude, slope, degree of harvest, forest volume with aerial photographs. Photo interpretation - mapping. Photo-interpretation data. Thematic Mapping Process. Applications of aerial photography in Forestry. Orthophotos - Orthophotomaps. Satellites. Satellite images. Radiation - Sensors. Spatial and temporal analysis of satellite data. Discrepancy of satellite data. Arrangement of digital data. Advantages of satellite data. Digital processing of satellite data. Image Enhancement. Sorting of satellite data - methods. Classification Accuracy. Exploitation of satellite images in forestry and the environment, applications. Combining satellite data with geographic information systems

#### **514. Forest Pathology**

Introductory concepts, biology, morphology and classification of the most important pathogens (fungi, bacteria, viruses). Description of the main pathogens of coniferous and deciduous forest trees. Plant nursery diseases and ways to control them. Root diseases. Controlling rotting in the forest. Abiotic factors as forest enemies. Damage to forest trees due to pollution and adverse weather conditions. The aim of the course is for undergraduate students to acquire the ability to distinguish diseases from the various symptoms they manifest in conifer and broadleaf species of Greece and the Balkans, but also of the wider Mediterranean basin. In addition, knowledge is provided regarding biotic and abiotic pathogens and when their combination adversely affects forest ecosystems and plant communities. Emphasis is placed on pollution effects on the physiology of forest trees. Understanding the biology and ecology of pathogens and basic ways of managing them.

### **515. Protected areas**

Purpose of the course is the understanding by the student of the necessary knowledge values, functions, protection, restoration and management of protected areas, categories of protected areas (NATURA 2000, Special Protection Areas (SPA), the Council of Europe's Biodiversity Network, National Parks, Aesthetic Forests, Preserved Natural Monuments, Wetlands) and legislation at national, European and international level that governs them. Management of protected areas: guidelines for drawing up action plans and management of protected areas.

### **Elective courses**

#### **521. Ecosystem Services**

Basic concepts - Definitions. Chronology. Ecology and ecosystem services. Biodiversity - ecosystem resilience and ecosystem services. Identification and evaluation of ecosystem services. Data and information on ecosystem services. Ecosystem services and natural resource management. Upon successful completion of the course the student will be able to:

- recognizes ecosystem services per ecological spatial unit,
- to participate in ecosystem services research, etc.

#### **522. Prey Breeding**

Design and organization of kennels. Site selection, building installations, constructions and equipment. Means used and ways of breeding. Farmed species biology, nutrition, reproduction and development. Biological and ecological parameters of breeding. Diseases of farmed species and ways of treatment. Upon successful completion of the course the student will be able to:

- has knowledge of game farming, farm design and management.
- uses the methodologies applied in the organization and operation of the farms for the preparation of special forestry and management studies,
- collaborates with his / her fellow students to create and present a plan-framework for a study of design, organization and operation of farms which, in the future in the course of his work as a Forester, will be part of a study-plan for a forest or other relevant study.

#### **523. Environmental Education**

Basic concepts and definitions of environment, nature, ecology, environmental issues and sustainability. Aims, principles and characteristics of environmental education. Institutional framework and integration models of environmental education in contemporary educational systems. Philosophical basis of modern environmentalism and the concept of

sustainable development. Teaching and learning methods: Lectures, experiential approaches, lab-type lessons, role playing, concept mapping, structured discussion, play, case study, environmental games.

#### **524. Forest Land Registry**

Introduction and general principles and concepts of the forest cadastre, geodesy data, trigonometric networks, photogrammetry and photo interpretation elements, means and methods of compiling land maps, evaluation and evaluation of them in the cadastre in relation to the value of the land, data required for registration and ownership of forest land. Information Bank - Earth Information Systems. Upon successful completion of the course the student will be able to:

- Has understood the methods of processing the corresponding data as well as the new technologies concerning the operation of data reception networks from automatic stations.
- Uses data processing methodologies to compile studies related to the creation and management of geospatial databases.
- Collaborates with his fellow students to create and present a plan-study framework which in the future in the course of his work as a Forester will be part of a study-plan for the creation and management of geospatial databases

### **6<sup>th</sup> SEMESTER**

#### **Compulsory courses**

##### **611. Silviculture**

Forest stand analysis. Origin of forest stand types. Stand structure analysis. Silvicultural treatment of forest stands. Natural regeneration, definition and methods. Conversion of coppice forests.

##### **612. Range Management**

Ecological principles of rangeland ecosystems. Principles of grazing management of mountain and forest rangelands. Methods of improvement of rangeland quality. Management plan for various types of rangelands.

##### **613. Game and Wildlife management**

Philosophical, economic, and political aspects of hunting and wildlife management. Hunting legislation and sustainable harvest, estimation of harvest quota and harvesting systems. Principles of habitat management and improvement, animal stocking and releasing techniques. Population ecology and dynamics, estimates of population size and population parameters, behavioral ecology, principles of population conservation and management. Habitat management and improvement, predation and predator control techniques. Methods for marking and capturing game species, techniques for determining sex and age, methods for the control and management of pest species, diet habits analysis, hunting methods and tools, safety, hygiene and maintenance of game species.

Upon successful completion of the course, students will be able to:

- understand the basic concepts related to game and wildlife management, as well as the interactions between wildlife, their habitat and other ecological factors
- acquire fundamental knowledge regarding game species
- be able to collaborate with fellow students in order to create and present a framework for game species management as future Foresters

## **614. Forest Entomology**

Basic concepts of general entomology. Elements of insect morphology and their systematics. Ecology, development and transformation of insects. Relationships between insects and the environment. Insect populations and causes of their overgrowth. Vulnerability, attractiveness, durability-defenses of forest trees. Atmospheric pollution and forest tree infestations. Secondary insect infestations. Insects that infect coniferous and deciduous forest tree species. Symptoms - damage from forest insects, control and coping mechanisms. Plant nursery, soil and root insects. Predatory insects. Insects that infect wood in use for domestic purposes. Cicadas. Upon successful completion of the course, students are expected to be able to identify the most important forest insects of Greece and propose measures for their management in forested areas.

## **615. Wood Technology**

Description, characteristics and technology of production (raw materials, machinery, production stages, technological conditions, quality control, storage) and processing of wood products (round, posts and piles, sawn timber, parquet, laminate, laminate, laminate, chipboard, fiberboard). Welded wood products OSB, LVL, PSL, and other composite wood products. Properties and uses of welded wood products. Drying, steaming, impregnation of timber. Surface treatment of welded wood products. Properties and uses of new wood products. Identify and study the properties of the major wood products (round and sawn timber, lumber, non-stick, laminated wood, chipboard, OSB, LVL, fiberboard, laminate, and other composite wood products). Study of hygroscopicity and dimensional behavior among wood products. Study of mechanical strength between wood products.

Upon successful completion of the course the student will be able to:

- Knows the processing methods and production stages of wood products.
- Uses processing methodologies and production stages for wood products
- Has the skills to respond to future research or professional activities

## **Elective courses**

### **621. Forest Valuation**

Basic concepts regarding forest valuation, inventories, future and present value, capitalization of costs and revenues of forest holdings. Introduction to the concept and purpose of depreciation, its determinants and methods of calculation. Estimation of the value of natural resources (Direct and Indirect valuation methods). Estimation of the value of non-market environmental goods, possible damages and compensations as well. Assessment and evaluation of natural resources contribution to the national product. Upon successful completion of the course the student will be able to:

- understand the basic concepts of forest production and the assessment of the value of forest land
- understand the concepts of interest, interest rate, discounting, and to calculate the value of capital
- acquire knowledge about the capitalization of expenditures and revenues, as well as the calculation of the value of periodic revenues or expenditures on forest holdings.
- understand the meaning of depreciation
- calculate gross revenues and expenditures (fixed and variable), in order to estimate the economic result of each intervention in the forest holding or enterprise.

### **622. Fungi - Macromycetes**

General information about fungi. Basic elements of their morphology and anatomy. Reproduction - multiplication, fungal physiology, classification. Categories of macromycetes. Macromycete groups in forest and grassland ecosystems. Protection, ecological and economic importance of macromycetes. Mushrooms of Greece. Upon successful completion of the course the undergraduate student will be able to:

- Understand how fungi spread and dominate in forested ecosystems.
- Understand the relationships between fungi and different fauna groups/divisions.
- Understand how fungi contribute to the preservation of forest ecology.
- Identify key species of fungi found in forests and other areas.
- Understand how fungi are associated and cause pathological conditions in forest fauna species.

### **623. Freshwater fish farming**

Generally, about fish farming. Fish farming systems and technologies. Methods and Stages of production of intensive fish farms, fish breeding stations. Transport of live fish. Rational fish farming management and optimization of interactions with the environment. Indoor fish farming elements, trout, carp and other fish of the family Cyprinidae, Eel, Sturgeon, aquarium fish species. Upon successful completion of the course the student will be able to:

- has knowledge of the processes of organization and operation of freshwater fish farming,
- uses the methodologies used in freshwater fish farming and for the preparation of studies for freshwater fish farming,
- collaborates with his / her classmates to create and present a blueprint for a fish farming study which, in the future, as part of his work as a Forester, could be part of a design study for a wider forestry development study; and mountain economy.

### **624. Indigenous Aromatic and Medicinal Plants**

Systematic classification of aromatic, medicinal and beekeeping plants of the Greek flora. Botanical characteristics (morphology, physiology) and geobotanical characteristics (ecology, chorology, dynamics, history) of Aromatic, Medicinal and Beekeeping plants. Their practical and economic importance.

## **7<sup>th</sup> SEMESTER**

### **Compulsory courses**

#### **711. Management of Natural Ecosystems**

Basic concepts of Management Science and Business Research. Problem-solving process for natural terrestrial ecosystems. Quantitative and qualitative analysis methods. Time and financial project planning, linear programming, decision theory, simulations, dynamic programming. Management Science and natural terrestrial ecosystems. Concepts of time and space in the management of natural terrestrial ecosystems. Purpose of Forestry. Organization of the forestry enterprise. Factors of production in Forestry. At the end of the lectures and exercises within the course, the student will be able to:

- Use qualitative and quantitative analysis methods to make decisions related to the optimization of Natural and Forest Ecosystem Management

- Organize forest production with the aim of sustainability (continuous production of maximum quantity and quality without harming the ecosystem).

### **712. Forest Genetics**

Basic concepts, definitions. Possibilities, perspectives, history and importance. The Molecular basis of heredity - Organization of the genome. Structure and regulation of genes, gamete formation. Transfer genetics - chromosomes, recombination and binding. Genetic markers - morphological, biochemical and molecular markers. Population genetics - gene frequencies, homogeneity and evolutionary forces. Quantitative Genetics - Polygenic Traits, Inheritance and Genetic Correlations. Importance of genetic inheritance in the efficiency of forest ecosystems. Genotypes and phenotypes in forestry species. Importance of forest management in preserving the desired genetic inheritance characteristics. After the lectures and exercises within the course, the student will be able to:

- To know basic concepts of genetics and how they are related to forest ecosystems
- To use basic genetic tools that could be used in the study, improvement and protection of forest ecosystems.

### **713. Torrent Management and Control I**

Scope of the Mountain Water Management. Historical background. Distinction, nomenclature, morphometric characteristics and parts of torrents. Flow in torrents' beds. Measurement of runoff - flows in torrents and other watercourses. Production and transport of sediment in torrent beds and laws of degradation and desertification of upland areas. Calculation of sediment - solid matter - solid yield. Equilibrium - changes in torrent beds. Tidal potential - tidal types. The tidal problem with emphasis on Greece.

### **714. Urban Forestry**

Urban ecosystem analysis. Influence of urban greening in the regulation of the environmental factors. Ecological selection of forest species. Management of urban greening. Urban trees management. Silvicultural treatments of the street and park trees.

### **715. Environmental Impact Assessment**

Introductory concepts. Technical specifications for the preparation of Environmental Impact Assessments (E.I.A). Particular reference is made to examples of environmental impacts in areas of the natural environment, from the construction and function: a. hydropower - irrigation dams and water supply dams & reservoirs, b. road works, c. mining (quarries, mines, mines), d. port projects and e. Services Sanitary Landfill, etc.

## **Elective courses**

### **721. Non-Wood Forest Products**

Definitions, discrimination and classification of non woody forest products. Sustainable harvesting of fruit. Possibilities and systems for harvesting and utilization of non woody forest products, such as: edible forest products (seeds, fruits, fruits, mushrooms, pollen, roots, leaves, stems, bulbs etc.) and other non woody forest products (resin, bark) , chestnut, gum, mastic, fibers, cones, Christmas trees), aromatic and medicinal parts of forest trees and shrubs, utilization of their wood extracts. For each of the above non-wood forest products, analysis and selection of appropriate socio-technical systems of production, sustainable harvesting and utilization.

Upon successful completion of the course the student will be able to:

- Knows the non-timber forest products produced.

- Uses the appropriate socio-technical systems for the production, sustainable harvesting and utilization of these products
- Has the skills to respond to future research or professional activities.

### **722. Statistical Applications using Computers**

Data entry and storage. Descriptive statistics. Charts. Simple and multiple linear regression. Analysis of variance by one and two factors. Non-parametric controls. Application using computer software. The main goal is for the undergraduate student to understand random variables and theoretical probability distributions, measurement scales of variables, frequency tables, diagrams, measures of position and scattering, sampling techniques and non-parametric methods, single and multiple regression, co-variation and correlation, intervals of confidence, case controls and well-adjusted controls.

### **723. Literacy in science and the environment**

Learning theories in the Natural Sciences. Socio-cultural approach to the Natural Sciences and the Environment. Conceptual delimitation of the concept of environment. Clarification of the concepts "ecology" and "environmental issue". Highlighting the interdisciplinary nature of environmental issues. Presentation of the pedagogical goals of education for sustainability. Applications - teaching courses. Teaching tools. Upon successful completion of the course the student will be able to:

- can relate the content of each science course to environmental issues.
- he / she can, in collaboration with his / her colleagues, create and present study instruction for educational purposes in science and environment.

### **724. Special and Alternative Forms of Tourism**

Introduction to special and alternative forms of tourism (EMT). Definitions and categories. Agritourism, nature tourism (mountaineering, climbing, mountain biking, paragliding, horseback riding, skiing), sports tourism in national parks and wetlands (triathlon, mountain marathon, swimming, sailing, windsurfing, canoeing), diving, civil, research, conference tourism. Visitor profiles, requirements, infrastructure and new occupations (green jobs) in mountainous and natural areas. Trends and developments in modern tourism and the characteristics of each specific form of tourism (definition, evolution, development factors, trends and prospects, SWOT analysis) and the relationship of EMT. with the other special forms of tourism. Selected examples of good practice E.M.T. at international, European and national level. Principles and rules for the development of special and alternative forms of tourism in accordance with the current institutional framework. Upon successful completion of the course the student will be able to:

- has understood knowledge about the special and alternative forms of tourism, The types and organization of these activities, their evolution and development according to the current institutional framework.
- uses the methodologies and techniques used to find demand, develop and design specific and alternative forms of tourism,
- collaborates with his / her fellow students to create and present a project-study framework for the description and development of special and alternative forms of tourism which, in the future in the course of his work as a Forester, will be part of a study-plan for a wider study of regional - mountain development of an area or other relevant study.

### **725. Forestry Works and Constructions**

General concepts. Earthworks (earthworks, widenings). Roads (road parts, categories, construction). General principles of structural dimensioning. Concrete constructions. Wooden constructions. Metalwork. Stone constructions. Dimensioning of forest road construction structures. Small technical projects of forest road construction. Trenches. Drains. Retaining and supporting walls. Bridges. Financial data of constructions. Dimensioning of wooden structures. Wooden roofs. Formwork. Prefabricated houses. Rural construction. Opening of forest area. Drilling forestry projects. Forest constructions and natural environment. Upon successful completion of the course the student will be able to:

- Has understood the construction of all kinds of technical works and the execution of all kinds of works of protection and development of forests and forest areas.
- Uses data processing methodologies for project design and calculation of raw materials as well as the organization of the construction site for the construction of the necessary forestry projects.
- Has the skills to respond to future research or professional activities.

### **726. Wood Chemical Products**

Chemical composition and analysis of wood. Characteristics, properties and chemical reactions of cellulose, semi-cellulose, lignin and extracts. Chemical properties and utilization of wood (chemicals, wood pulp, paper, polymer cellulose products, hydrolysates of wood, lignin, extracts and energy). Methods of chemical wood technology. Chemical wood products (pulp, paper, cellulose, cellulose derivatives - synthetic fibers, film, varnishes, etc., derivatives of semi-cellulose, lignin and extracts, sugars, resins, energy, etc.). Chemical production technology (raw materials, machinery, production stages, technological conditions). Properties and uses.

Upon successful completion of the course the student will be able to:

- Knows processing methods for the production of cellulose, hemicellulose, lignin, and wood extracts
- Uses the methodologies of treatment of thermal and chemical modification of wood for many products
- Has the skills to respond to future research or professional activities.

## **8<sup>th</sup> SEMESTER**

### **Compulsory courses**

#### **811. Forest Ecosystem Management**

Management planning and natural terrestrial ecosystems. Wood forest management: all aged forests, coppice forest, dual forests. Spatial organization of wood capital. Temporal organization of wood capital. Forest management methods. Estimation of timber volume and yearly increment. Natural terrestrial ecosystems management for multiple uses. Time and spatial planning for multiple use production. Remote sensing and geographic information systems in forest management. Forest recreation management, forest management for resin production, management of protected forests and woodland. Forest management for specific purposes.

Upon completion of the course the student is able to:

- to study/analyze problems of Forest Ecosystem Management and, in general, Natural Terrestrial Ecosystems management,
- to combine data from multiple sources,

- to make decisions on the selection of the most appropriate method of management of a Forest Ecosystem and
- write up a forest management plan.

## **812. Torrent Management and Control II**

General concepts (torrents, settlement, damping). Settlement principles and systems. Settlement purposes (protective, hydrological and utilisation). Settlement means. Technical works (categories, description, siting and construction of works). Dams, categories of dams, dimensioning, design of dams, stability conditions - analytical and graphical control. Agricultural works (categories, description, location and construction). Horticultural works (afforestation - reforestation, bushing - reforestation, clearing - reclamation). Horticultural design. Selection of planting material and horticultural methods. Shaping of hollows, diversions, water intakes, drainage, prevention of erosion, sedimentation and subsidence, management of geological landslides, ancillary works, use of landfill.

## **813. Wetland Ecosystem Management**

Introduction to wetlands. Definitions and categories of wetlands. Wetland classification criteria. Examples of wetlands of the planet and the Mediterranean. Functions of wetland ecosystems. Risks and threats, Natural changes and man-made alterations of wetlands. The legal framework for the protection of wetlands. Riverside (riverside and lakeside) forest and other ecosystems and habitats. Functions and values of riparian forest ecosystems. Wetland management principles. Wetland management plans. Management of wetland ecosystems in an institutionalized framework based on international and national rules (eg provisions of the Ramsar Convention, the European directives for the management of the Natura 2000 network through the management bodies of protected areas in Greece). Peculiarities of wetland management in relation to the general rules of management of protected areas - emphasis on management at the river basin level. Wetland assessment, mapping, classification and scientific monitoring. Creation, improvement - restoration and erection of wetlands. Use of artificial wetlands for wastewater management. Upon successful completion of the course the student will be able to:

- has understood knowledge about the operation and management of wetlands, the legal framework for their protection, assessment, mapping, classification and scientific monitoring.
- uses methodologies and techniques for wetland management plans,
- collaborates with his / her classmates to create and present a plan - framework for the management of wetland ecosystems which, in the future in the course of his work as a Forester, will be part of a study-plan for a management or other relevant study.

## **814. Forest Nurseries**

Establishment of a forest nursery. Forest nursery management. Seed collection and treatments. Seed tests according to ISTA. Irrigation of a nursery. Fertilization. Bare root seedlings. Balled and container seedlings. Nursery pests.

## **815. Forest and environmental Legislation**

Laws and regulations, separation of authorities. Legislation concerning forest property. Management of private and public forests. Reforestation and reforested lands. Provisions concerning forest protection, technical works and game management. Penal and procedural terms.

## **Elective courses**

### **821. Forest Species Ecophysiology**

Basic concepts, role and importance of Ecophysiology (adaptation - adaptability, strategy - tactics, adaptive mechanisms, natural selection). Forest tree ecophysiology (water economy, water availability and productivity, photosynthesis, biological uptake and nitrogen metabolism, germination and aging ecosystem, factors affecting tree metabolism, low ecosystems, extreme or dry conditions temperature). Mechanisms and response of trees to environmental stress. Upon successful completion of the course the student will be able to:

- has acquired scientific knowledge and critical thinking about the interactions between plant functions and the environment (including climate change) at different levels of organization (organs, whole plants, populations) and with different approaches (molecular biology, classical experimental physiology, physiology, ecology),
- Participate in research on plant species' reactions to habitat change and climate change.

## **822. Genetic Improvement of Forest Species**

Introduction-methods of implementation of genetic improvement programs. Natural forest diversity - research methods (diversity within populations - genetic diversity, cross-breeding systems and cluster structure, geographical diversity - breeds, successions and habitats, evolutionary genetics - differentiation, speciation and hybridization). Origins-terminology importance in genetic improvement. Search for origins. Forest tree improvement programs. Base populations - Species (native and foreign), hybrids, seed sources and breeding zones. Phenotypic bulk selection - genetic gain, trait selection, direct and indirect selection. Genetic testing - Cross-breeding designs, outdoor designs, experimental installation. Utilization (varieties from free pollination, cohabiting families and clones). Genomic discovery and functional analysis of genes, selection by genetic markers and improvement - indirect selection, direct selection and improvement applications, genetic engineering - target traits, transformation and regeneration. After the lectures within the course, the student will be able to:

- To have basic knowledge of genetic improvement in order to protect, enhance and manage forest ecosystems

To possess the principles of genetic improvement of forest species that allow him to apply these practices by choosing the most appropriate method on a case-by-case basis.

## **823. Urban Fauna Management**

Application of the science of ecology and management of wildlife species in the spatial context of the wider urban environment. Wildlife habitats in the urban landscape, factors influencing the presence of wildlife in the urban environment, effects of wildlife on the urban environment: diseases, overpopulation, imported species. Troubleshooting wildlife in the urban environment. Upon successful completion of the course the student will be able to:

Has an understanding of the ecology and management of urban fauna, diseases, imported species and problems in the urban environment.

- uses research methodologies on urban fauna and their relationship to the urban environment,
- collaborates with his / her fellow students to create and present a project - a framework for the study of urban fauna, which in the future in the course of his work as a Forester, will be part of a study-plan for an environmental or other relevant study.

## **824. Integrated Treatment of Animal Enemies of Forestry Species**

Basic concepts, definitions, philosophy of integrated treatment of insects and other animal enemies and application needs in forestry. Population monitoring and forecasting, damage

assessment. Resistance of forest species and varieties to insects. Biological insect control. Pathogenic insect microorganisms. Role of pathogens in the integrated treatment, Attractive and repulsive substances. Technological and biotechnological means and methods. Genetic control and cultivation of forest stands in the treatment of animal enemies. Upon successful completion of the course the student will be able to:

Has understood knowledge about the comprehensive treatment of insects and other animal enemies of the forest. The assessment of populations, the control of insects, pathogenic microorganisms.

- uses the methodologies and techniques of population control and cultivation of forest stands in the context of an integrated response to animal enemies,
- collaborates with his / her classmates to create and present a plan - a framework for a technical study of integrated treatment of animal enemies which, in the future in the course of his work as a Forester, will be part of a study-plan of a forestry or other related study.

### **825. Phyto-Techniques**

Introductory and historical background, purposes of phytotechnical works, biotechnical design, phytotechnical material, selection of phytotechnical material, selection of phytotechnical method, change in station quality, phytotechnical works, phytotechnical methods of settling sediment-producing foci, secondary depressions, bed and slope drainage, projects and methods of settling in stream valleys, methods of settling in the wider catchment area, flat and moderately sloping surfaces with slight surface erosion, methods of fixing moderately sloping, bare surfaces and agricultural soils, methods of horticultural settlement in special cases, in road construction, in traffic safety, in the reduction of noise nuisance, in protection against stone precipitation, in the expansion or acquisition of soil, protection of waterfronts and their embankments, methods and works for the settlement of dunes, effects, purposes.

### **826. Standardization-Certification of Forest Products**

Principles of standardization, terminology, characteristics, properties, quality and dimensions of wood and wood products. Standards. Methods and tests for quality control of wood and wood products. Standardization of wood products. Standards relating to wood products. The development of the theory of quality assurance and certification. Certification bodies and bodies. ELOT. The standards of the ISO 9000 series (Quality Assurance Systems), the ISO 14000 series (Environmental Management Systems) and EMAS and their requirements. Eco-labeling. Ecolabel and CE marking. Certification of forests. Advantages and disadvantages of standardization and certification.

Upon successful completion of the course the student will be able to:

- Acquire the necessary knowledge about the processes of elaboration, issuance and implementation of standards, systems for the certification of forest products and forest areas.
- Be aware of the significant benefits of standardization in controlling and improving the suitability of products, processes and services; and
- Has the skills to respond to future research or professional activities.

## **9<sup>th</sup> SEMESTER**

### **Compulsory courses**

#### **911. Research methodology**

Checking and finding bibliography. Design and structure of work. Follow-up of presentations by invited researchers on issues related to Forestry and the natural environment. Writing assignments and oral and written presentation. Discussion on the assignments presented by the students. Upon successful completion of the course the student will be able to:

- Write a scientific paper.
- Uses methodologies to present a work in various ways
- Has the skills to respond to future research or professional activities.

### **912. Agroforestry**

Definitions of agroforestry, advantages and disadvantages, systems in Greece and other countries. Comparison of agroforestry to other land management systems such as organic farming, intensive agriculture, rangeland and forestry, individual assignment consisting of a research investigation on existing farms that the students have to describe and analyze from an environmental, economic and social point of view.

### **913. Forest fires**

Wildfires in Greece and in the world. Impact of forest fires on the environment. The ecology of wildfires on forests and other ecosystems in Greece. Causes and prevention, forest fire behavior, environmental impact, legislation, fire ignition forecasting, fire propagation modelling, means and techniques of fire extinguishing, settlement fire protection, fire ecology, protection and restoration of burned areas. Forest fuel, types and properties. Behavior - properties of fire. Meteorological factors and wildfires. Fire risk assessment. Causes, Prevention and Detection of wildfires. Fire risk reduction measures. Prescribed (controlled) burning. Methods, tools and fire extinguishing means. Tactics for extinguishing wildfires. Policies, training and coordination of stakeholders in dealing with wildfires. Tactics and ways of using aerial and ground means during firefighting. Information of the citizens. Protecting houses from wildfires. Firefighting plans, investigative work. Presentation of the use of portable firefighting equipment and tools, firefighting vehicles, aircraft and helicopters of all types. Methods, arrangements and combinations of forest firefighting, depending on the respective fire environment (vegetation, topography, meteorology) and wildfire behavior. Staff safety issues. The aim of the course is the acquisition of theoretical and practical knowledge by graduates so that:

- understand the phenomenon of wildfires and their ecological role in Greece, but also worldwide.
- acquire knowledge related to wildfire prevention, fuel treatment and firefighting, their socio-economic and environmental impact, and the management of burned areas.
- classify forest types and tree species by their ability to adapt (or not) to wildfires.
- describe and classify forest fuel types.

### **914. Forest and Environmental Policy**

Principles, methods and means of organizing the economy of forestry resources of large geographical divisions of the country and its whole. Study of people-forest relations. Cooperative forestry and credit policy. Economic evaluation of the importance of forest and forest land as a source of raw materials, energy, recreation and income. Selection of objectives and national forestry decisions. Social and economic development of the country's forestry. Forecasting trends in forest production and consumption in the context of social and economic changes at national level. Economic evaluation of the importance of forest and forest areas as a factor in protecting the country's development projects,

atmosphere and water potential. National forestry product in the context of forestry. Planning principles and financing of the various areas of forestry. Introductory concepts of environmental policy. European environmental trends and problems. Analysis of contemporary environmental problems. Conventions, agreements and conditions for the environment, biodiversity and natural resources. Environmental Action Plans. Non-Governmental Environmental Organizations. Conservation and promotion policies of protected natural areas. Land use policies.

Upon successful completion of the course the student will be able to:

- Knows methods, actions and mechanisms of forest and environmental policy.
- Uses data processing methodologies to make decisions on current forest and environmental policy issues
- Has the skills to respond to future research or professional activities.

### **Elective courses**

#### **921. Special Environmental Studies**

General concepts, definitions. The need and requirements for the preparation of Special Environmental Studies. Specifications, data finding, structure. Upon successful completion of the course the student will be able to:

- has acquired the necessary knowledge for the preparation of Special Environmental Studies.

#### **922. Citizen education for the natural environment**

Anthropogenic effects on the natural environment, educational methodological approaches, innovative educational programs, human-natural environment relationship, didactic strategies in the education of the natural environment, alternative forms of teaching in learning. Upon successful completion of the course the student will be able to:

- develop teaching materials to support the teaching of the natural environment at conferences, events, schools, etc.
- design teaching strategies and apply the appropriate, as the case may be, teaching method for teaching the natural environment to all types of audiences.
- teach about the environment by seeking to cultivate specific skills and attitudes.
- analyzes and evaluates videotaped teachings of himself or his colleagues.
- plans and implements activities of natural environment indoors and in the countryside.

#### **923. Ecological Assessments-Monitoring of ecosystems**

General concepts, definitions. The need and requirements for the preparation of Special Ecological Assessments. Specifications, data finding, structure. Implementation of a scientific monitoring system (habitat types, specific species of flora and fauna, identification of new pressures and threats). Procedures, time of application. Data Download and Report Structure. Upon successful completion of the course the student will be able to:

- has acquired the necessary knowledge to prepare Special Ecological Assessments,
- has acquired the necessary knowledge for the design and preparation of reports for the monitoring of habitat types and species.

#### **924. Restoration of Disturbed Areas**

Introduction and definitions of ecosystem disturbances and their restoration. Rehabilitation of disturbed areas based on ecological principles and time series data. Landscape

restoration. Restoration of biodiversity in disturbed areas with ecological characteristics. Basic principles of restoration of forests, wetlands, rural landscapes, dunes, rock formations and urban habitats. Presentation of typical examples of restoration of disturbed areas and ecosystems (case studies) and methods for monitoring the effectiveness of restoration actions. Upon successful completion of the course the undergraduate student will be able to apply:

Methods and techniques of landscape restoration

Basic principles of restoration of forests, wetlands, rural landscapes, dunes, rock formations and urban habitats.

### **925. Forest Recreation and Landscape Architecture**

Management of forest areas for recreation. Protected natural areas, aesthetic forests, national parks. Ecological effects of recreation on landscape. Planning of recreation works. Design of structures.

### **926. Regional development**

Basic concepts, goals of regional development. Regional policy strategies and instruments (investment incentives, productive and social infrastructure). Spatial dimension of economic activities and theories of location and regional development. Demographic developments, regional peculiarities and development patterns of the region. Regional inequalities. Mountain areas: natural, socio-economic and structural characteristics, development strategies and methods. Problems of mountain areas and their treatment. New directions of regional policy. Regional development programs. Local know-how, technological innovations and rural development. Regional administrative organization and regional economic policy. Greek regional policy. Administrative decentralization measures and regional planning. European programs and regional development. Upon successful completion of the course the student will be able to:

- Has understood basic concepts related to space and region.
- Has understood the systematic approach to the regional problem, especially in mountainous areas, the measurement of regional disparities, the causes and the reasons for addressing them.

Familiar with the main theories of regional economics, as well as with the basic framework for shaping regional policy.

### **927. Management of Forest Organizations and Businesses**

Concepts of organizational management and business administration. Decision making in forest organizations and companies. Distribution management systems. Human Resource management, employee motivation, ensuring effective communication. Production planning of forest industries. Social organization and spatial distribution of forest industries. Upon successful completion of the course the student will be able to:

- understand how to successfully manage a forestry organizations and enterprises
- develop management skills of an organization, according to the characteristics of the workforce
- develop organizational behavior
- management in an organization

evaluate alternatives and make more effective decisions, implementing

### **929. Forest Biomass and Energy**

Principles, methods and means of assessment and utilization of forest biomass for energy production. Forest biomass as a raw material for energy production. Existing situation and energy needs, problems and prospects for forest energy utilization. Design and models of forest energy. Production of wood fuels, charcoal and forest residues (harvesting and processing of wood). Problems and prospects for wood fuel production and consumption. Industrial products for forest biomass utilization (pellets, briquettes, charcoal briquettes). Advantages and disadvantages of using forest biomass for energy needs, the current situation in Greece.

Upon successful completion of the course the student will be able to:

- Knows the benefits of forest biomass for energy production
- Uses data processing methodologies to compile studies related to the development of industrial fuel units
- Has the skills to respond to future research or professional activities.

### **930. Environmental Ethics**

Basic concepts, definitions. Concepts of bioethics and environmental ethics. Principles of Interpretive and Environmental Interpretation. Areas of application of environmental ethics. Anthropocentric and ecocentric environmental ethics, biocentric ethics. Social Ecology. Traditional moral theories. Moral attitude of man towards the environment. Linking environmental issues and the concept of sustainability. Principles of the strategy for sustainable development (justice between the generations, quality of life, social cohesion, international responsibility). Relationship between environmental and social problems. Social values, environmental awareness and environmental ethics behavior derived from it (human rights). Upon successful completion of the course the student will be able to:

- judges actions and facts regarding Environmental Ethics
- understand the moral attitude of man towards the environment

### **931. Didactics of natural sciences for the environment**

Introduction to the teaching of Natural Sciences. Concepts and phenomena of the Natural Sciences, didactic approaches and theoretical aspects of the learning processes in the Natural Sciences, didactic strategies in the Natural Sciences. Education for Sustainable Development. The concept of sustainable development. Principles and philosophy of Environmental Education and "Education for the Environment and Sustainability". Micro-teaching and teaching evaluation. Upon successful completion of the course students will be able to:

- develop teaching materials to support the teaching of science and environmental issues.
- to design a teaching strategy and to apply the appropriate teaching method for the teaching of natural sciences and environmental issues.
- teach science seeking to cultivate specific skills and attitudes in the context of science literacy for the environment.

## **10<sup>th</sup> SEMESTER**

### **101. Thesis**