

**ACADEMIC YEAR: 2018-2019**

COURSE: Ecology and Dasometry

TYPE OF EDUCATIONAL ACTIVITY:

TEACHER: Francesco Ripullone

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Language: Italian

ECTS: (lessons / tutorials/practice): 12 (80 frontal lectures; 2 practice)	n. of hours: 80 hours lectures 32 hours practice	Campus: Potenza School: SAFE Program: LM Forest and Environmental Sciences	Semester: I & II
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#### EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course aims to provide students with a framework of knowledge about the basic principles of forest ecology, the basic elements of forest ecosystems functioning, main biogeochemical cycles, climatic and environmental parameters and their influence on the forest ecosystems. In addition, the course provides information concerning expertise for measuring standing trees and felled trunks and methods for volume estimation of the main types of forests.

- **Knowledge and understanding:** knowledge and ability to understand the basic principles of forest ecosystems functioning, the linkages and principles governing biogeochemical cycles; Knowledge and ability to understand the interactions between climate and forests, tree response to climate change and to natural disturbance factors and their ability to adapt in order to improve their resistance and resilience; Knowledge and ability to understand the techniques used for measuring the trees and methods used to estimate the volume of both standing and felled trees.
- **Applying knowledge and understanding:** at the end of the course students will be able to recognize and describe the main worldwide biomes, especially the Mediterranean biome; students will have the ability to understand and describe the forest ecosystems in their main aspects; students will be able to carry out some eco-physiological measurements to understand the levels of physiological stress achieved by the trees. Students will also be able to carry out dendrometric measurements in stands, to analyze and calculate the volume of standing and felled trees and draw up reports to get permission for cutting trees.
- **Making judgements:** ability to choose and apply the most suitable and relevant methodologies to understand the effects and impacts of natural and man-made disturbances on forests; ability to discriminate the most common symptoms to describe the forest vulnerability; ability to choose the most suitable forestry tools to measure trees; ability to identify the most suitable methodologies for estimating and calculating the forest volume.
- **Communication skills:** ability to communicate the issues highlighted during the course using a correct language and IT resources.
- **Learning skills:** ability to collect and organize information received during the lesson or obtained by the suggested books and by the available literature.



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**PREREQUIREMENTS**

- knowledge of physics and forest botany

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**SYLLABUS**

**ECTS-1:**

Basic principle of Ecology and general introduction to ecological studies. Forest ecology and relationships between men and forests through the history. General concepts of biodiversity and sustainable use of natural resources.

**ECTS-2:**

Major environmental and climatic factors (temperature, precipitation, wind, light etc.) and their influence on forest ecosystems.

**ECTS-3:**

Water cycle and water balance in forest ecosystems. Water transport through the soil-roots-canopy system. Climatic indexes and Phytoclimatic classifications. Biomes and forest landscapes.

**ECTS-4:**

The basic principles of mass/energy laws in nature, net radiation, radiative balance, energy balance, productivity. Ecosystems functioning and ecological factors. Energy flow and metabolism: food chains and ecological pyramids. Gross and net primary production in forest ecosystems, ecological efficiency.

**ECTS-5:**

Biogeochemical cycles (carbon and nitrogen). Carbon balance in forest ecosystems. General forests modeling. Climate change impacts on forests. The basic principles of Dendrochronology and Dendroanatomy techniques.

**ECTS-6:**

Population and community ecology. Forest ecosystem structure and hierarchical organization: individual, population and community. Intra-interspecific competition. Dynamics and human and natural disturbances in old-growth forests.

**ECTS-7:**

Basic principle of dendrometry. Measures of heights and tree diameters. Measuring dendrometric instruments in forestry: height instruments, tree caliper, relascope, core borer. Errors associated with dendrometric measures.

**ECTS-8**

Volume biomass of individual standing trees: sample plots, valuation survey, basal area, hypsometric curve. empirical methods for estimating standing trees. Shape tree coefficient. Estimation of standing and downed trees. Cubic timber in the stack and the cortex.

**ECTS-9:**

Types of log scales. One and two entry tree volume table. Selection of the method for tree volume estimation. Method of sample plots.

**ECTS-10:**

Synthetic estimation of tree volume in forestry: allometric log scale. Basic principles of relascope technique.

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ECTS-11 (Practice in field and laboratory):

To acquire knowledge of the forest and environmental relationship and the dynamic processes that drive growth, development and productivity of forests. To acquire knowledge of the techniques suitable for measurement of ecological parameters: Leaf area index, Scholander pressure chamber, Infrared Gas Analyser.

ECTS-12 (Practice in field and laboratory):

To acquire knowledge of techniques suitable to identify and border sample plots, and instruments suitable to measure diameters and heights. Data evaluation of measured dendro-auxometric variables. Use of log scales and softwares for data processing.

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#### TEACHING METHODS

Students could deepen into the different topics covered during the course through practical field sampling. During practices students will be asked to calculate volume of stands in measured plots.

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#### EVALUATION METHODS

Oral examination and Discussion of the project works.

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#### TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Paci M. (2004) *Ecologia forestale*. Edagricole, Bologna.

Piussi P (1994) *Selvicoltura generale*. UTET, Torino.

La Marca O., (2004). *Elementi di dendrometria*. 2<sup>a</sup> edizione, Patron Editore, Bologna.

Slides from lessons.

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#### INTERACTIONS WITH STUDENTS

- in the office at planned days/hours

- e-mail

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#### EXAMINATION SESSIONS (Forecast)

Usually the third Tuesday of every month (except August). See on the web site <https://unibas.esse3.cineca.it/Home.do>

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#### EXAMINATION BOARD

Francesco Ripullone

Domenico Pierangeli

Marco Borghetti

Nicola Moretti

Angelo Nolè

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SEMINARS BY EXTERNAL EXPERTS: YES

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