

Syllabus

Course description

Course title	Forestry and Forest Ecology
Course code	40201
Scientific sector	AGR/05
Degree	Bachelor in Agricultural, Food and Mountain Environmental Sciences
Semester	II
Year	III
Academic year	2023/24
Credits	12
Modular	Yes

Total lecturing hours	36+36
Total lab hours	
Total exercise hours	24+24
Attendance	Recommended, particularly at the exercises
Prerequisites	Knowledge in botany and soil chemistry and fertility
Course page	See Resource Collection

Specific educational objectives	<p>Understanding the concepts of ecology is fundamental in the context of either conservation of natural resources or sustainable forest management, especially in the fate of climate change and anthropogenic pressures. Thus, the course will introduce the students to ecological theory and terminology, factors affecting forest structure and composition, on the effects of environmental gradients on plant species distribution, the dynamics of forest communities over time and key ecosystem-level processes such as nutrient and carbon cycling. Students will also learn how natural and human-induced perturbations affect forest dynamics and ecosystem services and how appropriate forest management could increase resilience to perturbations. In this context, they will be introduced to silvicultural techniques and their applications to meet a variety of landowner or stakeholder objectives in forested stands and multiple ecosystem services. Students will learn how to analyse and interpret the growth of individual trees and the dynamics of forest stands to develop decision tools and design silvicultural prescriptions for sustainable forest management.</p>
--	--

Module 1	Forestry
Lecturer	Roberto Tognetti, K Building, Room K2.03 Roberto.Tognetti@unibz.it
Scientific sector of the lecturer	AGR/05

Teaching language	English
Office hours	Upon appointment
Teaching assistant (if any)	Alessandro Andriolo, K Building, Room 402, email: alessandro.andriolo@unibz.it
Office hours	Upon appointment
List of topics covered	<p>Silviculture: definition of wood, tree, forest and silviculture; concept of forest ecosystem services; definition of afforestation, reforestation, and deforestation; forests in the world, in Italy and Sud Tyrol; forest dynamics and successional processes; principle of dendrochronology and dendroecology; site description; forest stand description (i.e., composition, density, vertical and horizontal structure, development stage); management of coppices; management of even-aged forests; thinning; management of uneven-aged forests; examples on the management of the most important forest categories in South Tyrol.</p> <p>Forest mensuration: fundamentals of biometrics and statistics; fundamentals of measuring tree growth and volume; methods for assessing forest biomass; principles of relascopy; sampling techniques and data analyses; measuring timber products.</p>
Teaching format	<p>Lectures will provide an overview over basic silvicultural and forest mensuration concepts and highlight the scientific basis for silvicultural practices.</p> <p>Field trips will provide real world experiences. They will help visualize basic ecological and silvicultural concepts.</p> <p>Laboratory and computer exercises will help the students to apply mensuration concepts to collected data.</p> <p>Power Point presentations will be available in the course reserve collection database of the faculty.</p>

Module 2	Forest Ecology
Lecturer	Leonardo Montagnani, K Building, Room K2.06a, email: leonardo.montagnani@unibz.it ;
Scientific sector of the lecturer	AGR/05
Teaching language	English
Office hours	Upon appointment
Teaching assistant (if any)	
List of topics covered	<p>Understanding forest functioning in the context of the changing climate and human pressure.</p> <p>The concept of ecosystem. Resources and conditions. The ecological role of solar radiation and temperature. The transfer and storage of energy in ecosystems.</p> <p>Biogeochemical cycles: the carbon, water, and nutrients</p>

	<p>cycle in forest ecosystems. Forest productivity: gross and net primary productivity, net ecosystem productivity, and net ecosystem carbon balance.</p> <p>Interaction among species in forest ecosystems: symbiosis, competition, predation, parasitism, commensalism, mutualism, amensalism.</p> <p>Forest and disturbances: Fire, pests, and wind effects</p> <p>Forests and climate change: mitigation and adaptation. Ecological successions.</p> <p>Models and their role in resource management.</p>
Teaching format	The course will include frontal lectures, field activities, class, and laboratory work.

Learning outcomes	<p>Knowledge of the theoretical basis of ecology applied to the study of forest ecosystems.</p> <p>The capacity of learning and synthesizing scientific literature. The capacity of conceiving field experiments and analysing experimental data.</p> <p>Communication skills: through active participation in lessons, students will learn how to present the acquired knowledge in an appropriate way. Practical experience with measured data and scientific literature will also develop the ability to summarize and communicate the results of their analysis.</p>
--------------------------	--

Assessment	The mark will be based on the outcome of the activities done during the course, including field exercises and written essays. The assessment will be complemented by a final oral exam.
Assessment language	English
Evaluation criteria and criteria for awarding marks	Criteria of evaluation will be the acquired capacity to making research activities alone and in a group. For the final assessment, the ability to summarize, evaluate, and establish relationships between topics will be evaluated.

Required readings	Recent scientific literature will be provided during the course.
--------------------------	--

Supplementary readings

Recommended texts for personal study of course topics:
P. Piussi, G. Alberti (2015). "Selvicoltura generale. Boschi, società e tecniche colturali". Compagnia delle Foreste, Arezzo.
Ashton, M., & Kelty, M. (2018). The Practice of Silviculture (10th ed.). Wiley.

Kimmins JP. (2005). Forest ecology: a foundation for sustainable forest management and environmental ethics in forestry. London: Macmillan Publishing. 3rd ed.
Chapin III, F.S., Matson, P.A., Vitousek, (2011). Principles of Terrestrial Ecosystem Ecology. Springer.