

Teacher(s)	Bragard Claude ;Legrève Anne ;Ponette Quentin ;Vincke Caroline ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	Sylviculture, general ecology, plant physiology, botany, soil sciences, phytopathology bases.
Main themes	This course aims to provide the foundations necessary to understand how biotic and abiotic factors, in interaction, affect the functioning and health of forest ecosystems. The regulation of energy, water, nutrient and carbon flows within the soil-tree-atmosphere continuum is described, as well as extreme abiotic (heat waves, pollution, drought, etc.) or biotic (pathogens and pests) likely to disturb trees. Biotic factors are presented according to their cycles / modes of development and their symptoms. This course also provides the bases necessary to carry out the diagnostics highlighting the imbalances in the functioning of forest ecosystems. Finally, it proposes management strategies to reduce the exposure of ecosystems to risks, increase their stability and resilience and, where appropriate, propose approaches to managing health crises.
Learning outcomes	
Evaluation methods	Written exam on a theoretical development, specific or transverse. Part of the evaluation will be done through an individual report to write on a specific subject.
Teaching methods	The course takes the form of a lecture (requiring a face-to-student), accompanied by active learning mini-activities (guided and Review, recurring quiz) and concrete examples and news. According to the news and opportunities, guest speakers are participating in this course.
Content	<p>1. Forest health - concepts:</p> <ul style="list-style-type: none"> - disturbances / hazards, risk, exposure, sensitivity, vulnerability/ stability, resistance, resilience - diebacks vs diseases: conceptual approaches (triangle of disease, Postulates of Koch, Bradford Hill, Manion) - interactions between abiotic and biotic factors and examples - diagnostic tools and management strategies / intervention thresholds: "specific risk" oriented approaches and systemic approaches <p>2. Abiotic factors</p> <p>2.1. Energy, water, nutrients and carbon flows in forest ecosystems</p> <p>Cycles and interaction between cycles</p> <p>2.2. Impact of abiotic factors on the functioning and health of forest ecosystems</p> <ul style="list-style-type: none"> - extreme temperatures, frost and heatwave - water supply: water deficit and hypoxia - nutritional risks: deficit and excess - winds <p>3. Biotic factors affecting forest health:</p> <p>3.1. Pathogens</p> <ul style="list-style-type: none"> - diversity of pathogens and diseases and their symptoms - typical examples illustrating diagnostic methods, the parasitic cycle, epidemiology of diseases, risk factors, means of control and control. <p>3.2. Pests (insects, mites, nematodes, etc.)</p> <ul style="list-style-type: none"> - diversity of species and damage - typical examples illustrating development cycles, interactions with other agents, means of control and control. <p>4. Monitor and manage forest health</p> <p>4.1. Belgian and European legislation related to plant health</p> <ul style="list-style-type: none"> - high-risk plants, priority pests, quarantine organisms or regulated pests outside of quarantine, emergency measures, passport for plants. <p>4.2. Monitoring systems and alert networks</p> <ul style="list-style-type: none"> - forest monitoring and indicators - surveillance (eg sentinel nurseries, CRAw public bodies, OWSF, etc.) <p>4.3. Impacts, prevention and control:</p> <ul style="list-style-type: none"> - basic principle: reduce exposure to risk, increase stability and resilience

	- impacts of the disappearance of a woody species (economic, social, cultural, landscape, etc.) 4.4. Examples of health crisis management and ecosystem restoration
Inline resources	Moodle
Bibliography	Support : Notes de cours, transparents, site icampus. Ouvrages recommandés : Barnes, B.V., Zak, D.R., Denton, S.R., Spurr, S.H., 1998. Forestecology. 4th ed. John Wiley & Sons, New York, USA, 774 p. Bazzaz, F.A. 1996. Plants in changing environments. Linking physiological, population, and community ecology. Cambridge University Press, Cambridge, UK, 320 p. Chapin III, F.S., Matson, P.A., Mooney, H.A. 2002. Principles of terrestrial ecosystem ecology. Springer, New York, USA, 436 p. Fisher, R.F., Binkley, D. 2000. Ecology and management of forest soils. 3rd ed. Wiley, New York, 489 p. Kimmins, J.-P., 1997. Forest ecology. A foundation for sustainable management. 2nd ed. Prentice Hall, Upper Saddle River, USA, 596 p. Lambers, H., Chapin III, F.S., Pons, T.L. 2000. Plant physiological ecology. Corrected 2nd printing. Springer, New York, 540 p. Larcher, W. 2003. Physiological plant ecology. Ecophysiology and stress physiology of functional groups. 4th ed. Springer, Berlin, 513 p. Encadrement : Enseignant et intervenants extérieurs pour le cours magistral ; enseignant, technicien et assistant pour les TP.
Other infos	This course can be given in English.
Faculty or entity in charge	AGRO

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [60] in Biology	BIOL2M1	3		