



Universitat de Lleida

DEGREE CURRICULUM
FOREST PHYSIOLOGY

Coordination: SERRANO ENDOLZ, LUIS

Academic year 2023-24

Subject's general information

Subject name	FOREST PHYSIOLOGY		
Code	11381		
Semester	1st Q(SEMESTER) CONTINUED EVALUATION		
Typology	Degree	Course	Character
	Erasmus Mundus Master's Programme in Mediterranean Forestry and Natural Resources Management (MEDFOR)	1	OPTIONAL
			Modality Attendance-based
Course number of credits (ECTS)	3		
Type of activity, credits, and groups	Activity type	PRACAMP	TEORIA
	Number of credits	1.5	1.5
	Number of groups	1	1
Coordination	SERRANO ENDOLZ, LUIS		
Department	AGRICULTURAL AND FOREST SCIENCES AND ENGINEERING		
Important information on data processing	Consult this link for more information.		

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
AGUILERA DELGADO, MÒNICA	monica.aguilera@udl.cat	2	
SERRANO ENDOLZ, LUIS	luis.serrano@udl.cat	1	

Learning objectives

To know the main factors that are related to growth of woody plants and the particular constraints imposed by Mediterranean conditions: shortage of water, nutrient scarcity and high radiation and temperature stresses. To understand the consequences of management and cultural practices on forest ecology.

- Tree growth requirements**

- Carbon balance of forests:**

Concepts and methods

- Abiotic stresses in Mediterranean communities:**

Effects and plant responses

- Management and Forest Ecology:**

Traditional practices and recent Forest Change

Competences

The student will learn to integrate physiological information as a tool to solve ecological and management problems.

Subject contents

Theory:

1. Plant structure and function
 - 1.1. Introduction to plant anatomy relevant to forest physiology
2. Plant water relations
 - 2.1. Multiple roles of water
 - 2.2. Regulation of water
3. Plant carbon balance
 - 3.1 Limitations and variability of photosynthesis
4. Stable isotopes
 - 4.1. Carbon isotope composition

4.2. Oxygen isotope composition

4.3. Hydrogen isotope composition

Devices and technics used in Forest Physiology:

1. Sap flow sensors
2. Photosynthesis (IRGA)
3. Water potential and Relative water content
4. Plant water status & Water use efficiency (Stable isotopes)
5. CO₂ and light response curves
6. LAI / SPAD
7. Correlation with climatic variables and multivariate statistics
8. Dendrochronology - Wood cores extraction
9. Dendrometer
10. NDVI

Methodology

This course uses a case-based learning strategy, adapted to collaborative practice in small teams.

The inquiry case study is focused on a real situation: How to explain coexistence of different Mediterranean species with contrasting strategies in the use of resources?

Theoretical-practical orientation and solve-problem approach leading to improve the presentation, interpretation and discussion of the results of the acquired experimental data.

One of the key points of the methodology followed in this course is that both teachers complement each other to deal the diversity of academic backgrounds of the students.

2/3 Theory and seminars

1/3 Field work

Fieldwork:

Instrumentation
and techniques in a case study

- Comparison of different species
at Botanical garden (Arboretum)

Seminar:

Oral presentations, discussion of results

- Discussion of selected papers

- Discussion and oral presentations of data from fieldwork

Evaluation

The evaluation of the course integrates three main sections: class work (15%), field work (35%) and the presentation of the study case results (50%)

Bibliography

LITERATURE

Taiz, L., & Zeiger, E. (2010). *Plant Physiology*, 5th Ed. Sinauer. USA.

Landsberg, J. J., & Sands, P. (2010). *Physiological ecology of forest production: principles, processes and models* (Vol. 4). Academic Press.

Rodà, F. (Ed.). (1999). *Ecology of Mediterranean evergreen oak forests* (Vol. 37). Springer.

Ne'eman, G., & Trabaud, L. (Eds.). (2000). *Ecology, biogeography and management of Pinus halepensis and P. brutia forest ecosystems in the Mediterranean Basin*. Postbus 321, 2300 AH Leiden, The Netherlands: Backhuys Publishers.

Zavala, M. A., Espelta, J. M., & Retana, J. (2000). Constraints and trade-offs in Mediterranean plant communities: the case of holm oak-Aleppo pine forests. *The Botanical Review*, 66(1), 119-149.

USEFUL LINKS

Plant structure & function

http://www.phschool.com/science/biology_place/biocoach/plants/basic.html

PLANT WATER RELATIONS

Landsberg_ForestHydrology

<http://www.sciencedirect.com/science/article/pii/B9780124359550500042>

Diffusion & osmosis

http://www.phschool.com/science/biology_place/labbench/lab1/concepts.html

Transpiration

http://www.phschool.com/science/biology_place/labbench/lab9/intro.html

Water potential

http://www.phschool.com/science/biology_place/labbench/lab1/watpot.html

CARBON BALANCE & PHOTOSYNTHESIS

Landsberg_CarbonBalanceForests

<http://www.sciencedirect.com/science/article/pii/B9780124359550500054>

Tutorial Photosynthesis

<http://www.hartnell.edu/tutorials/biology/photosynthesis.html>

QUIZ Photosynthesis

<http://www.hartnell.edu/tutorials/biology/photosynthesis%20quiz/photosynthesisquiz1.html>