



Universitat de Lleida

DEGREE CURRICULUM

SPECIAL TOPICS IN EFFECTS OF FIRE ON SOIL SCIENCES

Coordination: OLARIETA ALBERDI, JOSE RAMON

Academic year 2023-24

Subject's general information

Subject name	SPECIAL TOPICS IN EFFECTS OF FIRE ON SOIL SCIENCES			
Code	11442			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Erasmus Mundus Master's Programme in Mediterranean Forestry and Natural Resources Management (MEDFOR)	2	OPTIONAL	Attendance-based
Course number of credits (ECTS)	3			
Type of activity, credits, and groups	Activity type	PRACAMP	PRALAB	TEORIA
	Number of credits	1	1	1
	Number of groups	1	1	1
Coordination	OLARIETA ALBERDI, JOSE RAMON			
Department	ENVIRONMENT AND SOIL SCIENCES AND CHEMISTRY			
Teaching load distribution between lectures and independent student work	30 h lectures and field trips 45 h personal work			
Important information on data processing	Consult this link for more information.			
Language	English			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
OLARIETA ALBERDI, JOSE RAMON	joseramon.olarieta@udl.cat	3	

Learning objectives

To understand soil processes and their relationship with plant development and forest management.

To understand the various possible impacts of forest fires on soils and their spatial and temporal variability

Competences

- Generate and interpret soil data
- Manage forest areas preserving or improving the quality of soils.
- Control degradation and efficiently use soil resources
- Evaluate hydrological, geomorphological and edaphic risks, and plan measures to reduce them and minimize their impacts

Subject contents

- Main soil characteristics and their influence on the distribution and growth of forest species and on water flows and availability for plants
- Effects of fires: soil surface processes (erosion and sedimentation); carbon and nutrient flows; changes in physical and biological properties
- Soil management after fire: land use and land-use conflicts; afforestation

Methodology

- Lectures and classroom practicals (18 h)
- Field trips (12 h)

Development plan

The course will take place in October-December 2021

Evaluation

- A group report on the field trips (details of the contents will be discussed) and an oral presentation of the report (40%)
- An essay summarising and discussing a paper that will be provided (30%)

Bibliography

Basic:

Attiwill, P.M., G.W. Leeper. 1990. *Forest Soils and Nutrient Cycles*. Melbourne University Press, Carlton, Australia.

Fisher, R.F., D. Binkley. 2000. *Ecology and Management of Forest Soils*. John Wiley, Chichester.

Soil description and surveys:

Cools, N., De Vos B., 2020. Part X: Sampling and Analysis of Soil. In: UNECE ICP Forests Programme Co-ordinating Centre (ed.): *Manual on Methods and Criteria for Harmonized Sampling, Assessment, Monitoring and Analysis of the Effects of Air Pollution on Forests*. Thünen Institute of Forest Ecosystems, Eberswalde, Germany. <https://storage.ning.com/topology/rest/1.0/file/get/8952131501?profile=original>.

FAO. 2006. *Guidelines for Soil Description*, 4th edition. FAO, Rome. <http://www.fao.org/3/a-a0541e.pdf>

Landcare Research. 2013. The Digital Soil Map for New Zealand. Ministry for the Environment, Hamilton, NZ. <http://smap.landcareresearch.co.nz/home>

Soil Survey Division Staff. 2018. Soil Survey Manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. https://www.nrcs.usda.gov/wps/PA_NRCSCconsumption/download?cid=nrcseprd1333016&ext=pdf

Soils and water fluxes:

Birot, Y., C. Gracia, M. Palahí (eds.). 2011. *Water for Forests and People in the Mediterranean Region. A Challenging Balance*. European Forest Institute, Barcelona. http://www.efi.int/files/attachments/publications/efi_what_science_can_tell_us_1_2011_en.pdf. (Chs. 1.3; 1.4; 1.5; 2.2; 4.1; 4.3; 4.6; 5.3).

Neary, D.G., Ice, G.G., Jackson, C.R. 2009. Linkages between forest soils and water quality and quantity. *Forest Ecology and Management*, 258: 2269-2281.

Seyfried, M.S., et al. 2005. Ecohydrological control of deep drainage in arid and semiarid regions. *Ecology* 86(2): 277-287.

Land use and evaluation:

Lynn, I. et al. 2009. *Land Use Capability Survey Handbook*, 3rd edition. AgResearch, Hamilton, Landcare Research, Lincoln; GNS Science, Lower Hutt, New Zealand. <https://digitallibrary.landcareresearch.co.nz/digital/collection/p20022coll14/id/74/>

Olarieta, J.R., R. Rodríguez-Ochoa, E. Ascaso. 2006. Land, land use, and land-use conflict. In: J. Estany (ed.), *Agriculture and Agri-food Production in Perspective. Profile of the Sector in Catalonia*. Edicions de la Universitat de Lleida, ch.16. ISBN: 84-8409-207-0. <http://www.solsforestals.udl.cat/uploads/files/Olarieta2006.pdf>

Effects of forest fires:

Attiwill, P.M., G.W. Leeper. 1990. *Forest Soils and Nutrient Cycles*. Melbourne University Press, Carlton. (Ch. 12).

Australian Academy of Science. 2020. *Soil Condition after Bushfires*. Australian Academy of Science, Canberra, Australia. <https://www.science.org.au/supporting-science/science-policy-and-analysis/evidence->

[briefs/soil-condition-after-bushfires](#)

Fisher, R.F. & D. Binkley. 2000. *Ecology and Management of Forest Soils*. John Wiley, Chichester. (Ch. 10).

Santín, C., Doerr, S.H. 2016. Forest effects on soils: the human dimension. *Philosophical Transactions of the Royal Society Section B*, 371: 20150171.

Wigley, B.J., Coetsee, C., Hartshorn, A.S., Bond, W.J. 2013. What do ecologists miss by not digging deep enough? Insights and methodological guidelines for assessing soil fertility status in ecological studies. *Acta Oecologica*, 51: 17-27.

Field assessment of soil erosion:

Griesbach, J.C. et al. 1997. *Guidelines for Mapping and Measurement of Rainfall-Induced Erosion Processes in the Mediterranean Coastal Areas*. FAO, Roma.
<http://www.fao.org/docrep/x5302e/x5302e00.htm#Contents>.

Afforestation:

Bocio, I., F.B. Navarro, M.A. Ripoll, M.N. Jiménez, E. de Simón. 2004. Holm oak (*Quercus rotundifolia* Lam.) and Aleppo pine (*Pinus halepensis* Mill.) response to different soil preparation techniques applied to forestation in abandoned farmland. *Annals of Forest Science* 61: 171-178.

Romero-Díaz, A., F. Belmonte-Serrato, J.D. Ruiz-Sinoga. 2010. The geomorphic impact of afforestations on soil erosion in Southeast Spain. *Land Degradation and Development* 21: 188-195.