

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	ENVIRONMENT AND AGRICULTURAL ENGINEERING		
<b>ACADEMIC UNIT</b>	DEPARTMENT OF NATURAL RESOURCES DEVELOPMENT AND AGRICULTURAL ENGINEERING		
<b>LEVEL OF STUDIES</b>	POSTGRADUATE		
<b>COURSE CODE</b>	630004	<b>SEMESTER</b>	B
<b>COURSE TITLE</b>	LAND DEGRADATION AND SOIL RESTORATION		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>
Lectures and practical exercises		3	5
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	Scientific field		
<b>PREREQUISITE COURSES:</b>	Soil science Soil genesis and soil taxonomy Soil Chemistry Environmental Soil Science Applied Soil Science Soil mapping and soil survey		
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	YES (in English language)		
<b>COURSE WEBSITE (URL)</b>			

### 2. LEARNING OUTCOMES

<p><b>Learning outcomes</b> <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> <li>• <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i></li> <li>• <i>Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i></li> <li>• <i>Guidelines for writing Learning Outcomes</i></li> </ul> <p><b>The course aims</b> at the acquisition of theoretical and practical knowledge, on the basic principles and concepts of land degradation and measures for the protection of soil resources, in the context of the complex processes that lead to the loss of soil functions and ecosystem services.</p> <p><b>Upon successful completion of the course, the postgraduate students will have:</b></p> <ul style="list-style-type: none"> <li>• Understand introductory concepts related to the functions and soil health.</li> <li>• Understand the nature of the processes leading to land and soil resource degradation.</li> <li>• The ability to evaluate the importance of environmental factors in accelerating degradation phenomena at the global level.</li> <li>• The ability to assess the risks of soil salinization - alkalization.</li> <li>• Understand the importance of the loss of organic matter from agricultural soils and the impact of this phenomenon on the climate crisis.</li> <li>• Understand land degradation as a result of soil contamination.</li> </ul>
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## General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information,  
with the use of the necessary technology

Adapting to new situations

Decision-making

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project planning and management

Respect for difference and multiculturalism

Respect for the natural environment

Showing social, professional and ethical responsibility and sensitivity  
to gender issues

Criticism and self-criticism

Production of free, creative and inductive thinking

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Others...

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- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Adapting to new situations
- Decision-making
- Working independently
- Team work
- Working in an interdisciplinary environment
- Project planning and management
- Respect for the natural environment

## 3. SYLLABUS

### Module 1: Introduction: Soil as a non-renewable natural resource.

Soil formation and its definition as a dynamic open natural system. Interaction of soil with the biosphere, atmosphere, hydrosphere and lithosphere. Relationship between land and soil resources. Categories of soils and pressures on them from human activity.

### Module 2: Land degradation processes.

Impact of the climate crisis. The impact of climate change and the impact of the climate change phenomenon. Reduction of biodiversity. The critical role of soil in land degradation.

### Module 3: Erosion - Compaction.

Water, wind, mechanical erosion. Soil compaction of soils. Changes in soil profile and topography. Loss of soil horizons and leaching of nutrients.

### Module 4: Salinity - Alkalisiation.

Conditions leading to degradation due to salt accumulation. What is alkalisiation and how it occurs. Physico-chemical changes in soil due to salinisation - alkalisiation processes. Soil dispersion and soil crusting.

### Module 5: Soil organic carbon losses and impact on the climate crisis.

Carbon balance. The physicochemical view of the impact of soil organic carbon. Organic carbon losses in the form of carbon dioxide. The organic/inorganic carbon ratio in different soil types. Soil management practices and organic carbon. Carbon storage and soil management strategies.

### Module 6: Chemical degradation.

Soil pollution and degradation of soil functions. The role of anthropogenic activities in soil acidification.

### Module 7: Measures to protect land resources.

Soil restoration. Soil improvement materials. Remediation of soil conditions. Sustainable intensification of agriculture and the role of integrated nutrient management. Cultivation measures. Soil management in the context of the climate crisis. Soil resource protection and soil health.

#### 4. TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i>	In classrooms.	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i>	Use of ICT in teaching, laboratory education, communication with students	
<b>TEACHING METHODS</b> <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i>  <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	<b>Activity</b>	<b>Semester workload</b>
	Lectures	48
	Study and analysis of bibliography	35
	Essay writing	42
	<b>Course total</b>	<b>125</b>
<b>STUDENT PERFORMANCE EVALUATION</b> <i>Description of the evaluation procedure</i>  <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i>  <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	<p>The evaluation will be conducted in Greek, except in the case of Erasmus postgraduate students, who will be assessed in English.</p> <p>The grade is calculated 50% from the final written examination in multiple-choice and short-answer questions and 50% from the essay/report.</p>	

#### 5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. C.J Barrow.1990. *Land degradation development and breakdown of terrestrial environment.* Cambridge University press: 295p.
2. Nyle C. Brady,2008. *Natural and properties of soils.* 14th edition. Prentice – Hall
3. Raymond W .Miller and Roy L.Donahue.1997.*Soil in our environment .7th Edition.* Prentice-hall India, Private Limited, New Delhi-11001:649p.
5. Onyango, V., Davies, J., Sharpe, N., Maiga, S.I., Ogali, C., Perez-Rocha, J. and Isakov, A. 2021. *Land degradation neutrality: A rationale for using participatory approaches to monitor and assess rangeland health.* Rome, FAO and IUCN.
6. FAO,1994 .*Land degradation in South Asia :Its severity, Causes and effect upon the people world soil resources reports No.78.*ISSN 0532-0488:102pDept. Agr., Washington, D.C.
- 7.IBRD/WB: (2006) “Sustainable Land Management: Challenges, Opportunities and Trade-off”, The World Bank, Washington, DC.
8. Thomas & Middleton (2004)“ Desertification: Exploding the Myth” Willey Chichester, UK
9. Bridges, E.M.et.al (2001)“Response to Land Degradation”, Oxford & Publ.Co. New Delhi.
10. Ziadat, F., Berrahmouni, N., Grewer, U., Bunning, S., Bockel, L., & Oweis, T. (2015). *Reversing land degradation in the drylands: scaling out and monitoring proven sustainable land management options.* In J. Griffiths (Ed.), *Living land* (pp. 14-17). United Nations Convention to Combat Desertification.