VNIVERSITAT DE VALÈNCIA

Course Guide
47090 Remediación y recuperación de aguas y suelos contaminados

COURSE DATA

DATA SUBJECT

Code: 47090
Name: Remediación y recuperación de aguas y suelos contaminados
Cycle: Master's Degree
ECTS Credits: 3
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
2285 - Máster Universitario en Contaminación Ambiental y Ecotoxicología	Facultat de Ciències Biològiques	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2285 - Máster Universitario en Contaminación Ambiental y Ecotoxicología	Cambio climático y contaminación ambiental	COMPULSORY

COORDINATION

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SUMMARY

In a highly anthropised world, where the management of resources and natural spaces has often been disrespectful to the health of ecosystems, the restoration of degraded spaces is a necessity that helps to re-establish the ecological functions of these systems and recover the services they offer to human society. This subject aims to provide the minimum content that students need to know about the remediation and recovery of degraded areas, both in terms of the ecological basis of restoration, the causes and effects of degradation, and the main techniques for the recovery of such areas, enabling students to acquire the criteria on which to base the most appropriate decisions regarding the need, and where applicable the technical possibilities, for recovering degraded areas.

The distinction between the concepts of remediation and recovery is important in the field of environmental restoration, as these are the activities most commonly used today in this type of work in degraded ecosystems, both in water and soil.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

There are no specified enrollment restrictions with other subjects of the curriculum.

COMPETENCES / LEARNING OUTCOMES

2285 - Máster Universitario en Contaminación Ambiental y Ecotoxicología

Acquire the capacity for autonomous and organised learning and for adapting to new situations.

Act autonomously in learning, make informed decisions in different contexts, issue judgements based on experimentation and analysis and transfer knowledge to new situations.

Contribute to the design, development and implementation of solutions that respond to social demands, considering the Sustainable Development Goals as a reference.

Demonstrate critical and self-critical reasoning in the field of the degree, considering aspects such as professional ethics, moral value and the social implications of the different activities carried out.

Develop the ability to work in multidisciplinary teams and to cooperate effectively.

Develop the capacity for analysis, synthesis and critical thinking in applying the scientific method.

Know systems for remediation, recovery and restoration of water, soil and aquifers.

Learn how to write scientific articles in the fields of environmental pollution and ecotoxicology.

Propose creative and innovative solutions to complex situations or problems within the field of knowledge to respond to diverse professional and social needs.

Understand the natural world as a product of evolution and its vulnerability to human influence.

Use different bibliographic sources and biological databases.

DESCRIPTION OF CONTENTS

1. Ecological bases of ecosystem remediation and recovery. Key concepts in restoration ecology. Ecosystem services.

2. Concept and types of degraded areas. Impact of various types of impacts on the structural and functional integrity of aquatic ecosystems: Impacts, degradation and destruction. Degradation of aquatic ecosystems. Physical, chemical and biological degradation.

3. Ecological trajectory. Reference ecosystems. Attributes of restored ecosystems. Concept of Remediation and

Recovery. Intervention, types, active and passive measures.

4. Recovery of aquatic ecosystems: Main techniques for the restoration of lakes, wetlands and reservoirs.

5. Recovery of aquatic ecosystems: Main techniques for the restoration of coastal aquatic ecosystems: dunes, marshes, coastal marine areas, reefs.

6. Recovery of aquatic ecosystems: Main techniques for the restoration of rivers and riverbanks. Wastewater treatment. Conventional purification and treatment in wetlands.

7. Vulnerability of aquifers. Strategies and technologies for the remediation of contaminated aquifers (in situ and ex situ). Physical, chemical and biological methods. Case studies.

8. Techniques for the recovery of saline soils. Methods used. Washing. Application of amendments. Sowing.

9. Techniques for the confinement and stabilisation of soil contaminants. Aspects of physical confinement, solidification and stabilisation will be addressed.

10. Physical-chemical techniques for soil decontamination. Washing, desorption, oxidation/reduction, electrokinetics.

11. Bioremediation and phytoremediation techniques for soil decontamination. Biostimulation. Bioaugmentation. Phytoextraction, phytostabilisation. Other techniques.

12. Selection criteria and general approaches to decontamination techniques for different contaminants. Selection factors. Case studies.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	24,00
Laboratory	6,00
Total hours	**30,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	1,00
Individual or group project	6,00
Independent study and work	5,00
Preparation of lessons	4,00
Preparation for assessment activities	25,00
Resolution of case studies	4,00
Total hours	**45,00**

TEACHING METHODOLOGY

Theoretical classes, in which the teaching staff will present the fundamental concepts of each of the topics. Prior to the class, the audiovisual material will be made available to students via the university's teaching support platform.

Theoretical-practical classes, in which students will carry out exercises or problem-solving related to one of the topics covered or critically review a case study.

Practical laboratory classes in which a phytoremediation test will be carried out.

EVALUATION

Exam. This will take place at the end of the course and a minimum mark of 5 out of 10 is required to pass the course. It will preferably be a written test, although it may also be oral if the teaching staff considers this more appropriate. It accounts for 60% of the total mark for the course.

Continuous assessment, non-classroom activities and activities related to cross-curricular skills. Seminars, critical reviews, classroom participation, analysis of practical cases, presentations, attendance and internship report, assignments. This accounts for 40% of the total mark for the course.

REFERENCES

- Cooke G. D., E, B. Welch, S. A. Peterson & S. A: Nichols. (2005). Restoration and Management ofLakes and Reservoirs. Taylor & Francis Group - CRC Press. Boca Raton, Fl
- Fingerman, M. & R. Nagabhushanan (2005). Bioremediation of aquatic and terrestrial ecosystems. SPScience Publishers, Enhfield (NH) USA, Plymouth, UK
- González del Tánago, M. et al (2008). Guía Metodológica para la elaboración de proyectos derestauración de ríos. Ministerio de Medio Ambiente, Madrid
- Livingston, R. J. (2006). Restoration of aquatic systems. Taylor & Francis Group - CRC Press. BocaRaton, Fl
- Meuser, H. 2013. Soil Remediationand RehabilitationTreatment of Contaminatedand Disturbed Land. Springer Dordrecht Heidelberg New York London
- O'Sullivan P. E. & C. S. Reynolds (ed.).(2005). The Lakes Handbook Vol 2: Lake restoration andrehabilitation. Blackwell.
- Parray, J.A., Hashem Abd Elkhalek Mahmoud, Sayyed, R. 2021. Soil bioremediation : an approach towards sustainable technology. Hoboken, New Jersey : Wiley.
- Revista *Restoration Ecology*, publicada por Wiley Online Library. Disponible en: https://onlinelibrary.wiley.com/journal/1526100x