

**COURSE DATA****Data Subject**

<b>Code</b>	33100
<b>Name</b>	Management and conservation of soil and water
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2021 - 2022

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1104 - Degree in Environmental Sciences	Faculty of Biological Sciences	3	Second term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1104 - Degree in Environmental Sciences	160 - Management and conservation of soil and water	Obligatory

**Coordination**

<b>Name</b>	<b>Department</b>
CARBO VALVERDE, ESTER	25 - Plant Biology
HERNANDEZ SANCHO, FRANCESC	132 - Economic Structure

**SUMMARY**

**MANAGEMENT AND CONSERVATION OF SOIL AND WATER** is a compulsory third year module conservation, environmental planning and management, degree in Environmental Sciences. The course is structured in 6 credits, taught in the second quarter of third year.

Given the importance of soil and water resources for all living beings and their influence on maintaining the quality of the environment, the student is required to know these resources and to protect its quality problems and avoid any bad influence them.

This course addresses, offering integrative approach that requires the current environmental problems, management and conservation of soil and water. It is a discipline in the study of the conditions suffered by the environment, studies their environmental impact and socio-economic and reveals strategies for conservation and management.



## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

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

### Other requirements

To be enrolled in all subjects of the modules "General Scientific Basis" and "Scientific bases of the natural environment"

The subject MANAGEMENT AND SOIL AND WATER CONSERVATION needs some previous knowledge of:

Soil  
Botany  
Cartography

## OUTCOMES

### 1104 - Degree in Environmental Sciences

- Conocimiento y capacidad de aplicación de las estrategias para la gestión y conservación de suelos y aguas.
- Conocimiento y capacidad de aplicación de metodologías y herramientas básicas para la gestión y planificación de los recursos edáficos.
- Conocimiento y capacidad de aplicación de las metodologías y herramientas básicas para la gestión y planificación de los recursos hídricos.

## LEARNING OUTCOMES

**MANAGEMENT AND CONSERVATION OF SOIL AND WATER** contributes to the development of skills and abilities of the degree through the acquisition during the study of the subject, the following capabilities:

- Capacity for analysis and synthesis
- Ability to learn and ability to apply theory to practice
- Ability to criticism and self
- Ability to generate new ideas (creativity)
- Ability to organize and plan



- Capacity for a commitment to sustainability
- Ability to recognize problems so common in interdisciplinary environmental systems. Skills to work in multidisciplinary teams. The discussion of cooperation and group problem
- Ability to make decisions, ability to develop and express judgments independently on problems of the environment
- Ability to use information technology, process data, analyze and synthesize data. Interpretation and evaluation of scientific data displayed in tables, graphs and statistical expressions, criticism of the results

Being more specific:

- Ability to handle technical aspects of environmental management and soil conservation
- Knowledge of procedures for assessing land degradation
- Ability to analyze real situations of soil and environmental problems in developing solutions based on the application of acquired knowledge
- Ability to develop and interpret laboratory processes in the laboratory data
- Understand the key concepts for the management and planning of water resources.
- Learn to reason about the possible solutions to water problems from the perspective of supply and demand.
- Build indicators of economic efficiency of water management.
- Know the main analysis methodologies in the management of water resources.
- Study the economic feasibility of water reuse projects.

## DESCRIPTION OF CONTENTS

### **1. Theme 01.- International conventions, legal framework and legislation (SECTION I: MANAGEMENT AND SOIL CONSERVATION).**

Protecting the global environment: Convention on Climate Change, Desertification and Biodiversity. Policies, Plans and Programs for the management and soil conservation. National and regional legislation on land management



**2. Theme 02.- Use and land management: processes of degradation (SECTION I: MANAGEMENT AND SOIL CONSERVATION).**

**3. Theme 03.- Soils affected by erosion, analysis, evaluation, management and conservation (SECTION I: MANAGEMENT AND SOIL CONSERVATION)**

Erosive agents. Types of erosion. Causes, factors and processes involved. Effects of erosion erosive morphologies. Methods, techniques and evaluation models. Strategies for management and soil conservation, prevention and control practices

**4. Theme 04.- Soils affected by salinisation, analysis, evaluation, management and conservation (SECTION I: MANAGEMENT AND SOIL CONSERVATION)**

Origins and processes of salt accumulation in soil: natural and induced salinity. Types of sales: abundance, toxicity and effects. Salinity, sodicity and Alkalinization Methods, techniques and evaluation models. Spatial-temporal variability of salinity. Management of saline soils: influence of water quality and other factors involved

**5. Theme 05.- Soils affected by loss of organic matter: analysis, evaluation, management and conservation (SECTION I: MANAGEMENT AND SOIL CONSERVATION)**

Importance of organic matter in soil fertility. Soils as carbon sink. Causes of loss of organic matter, reduced biomass and reduced biodiversity: Processes. Environmental consequences. Evaluation methods. Use and poor soil management in organic matter. Mechanisms of stabilizing carbon. Carbon sequestration and climate change: soil management for storage and conservation of areas of special interest

**6. Theme 06.- Land affected by contamination and other degradation processes: analysis, evaluation and management (SECTION I: MANAGEMENT AND SOIL CONSERVATION)**

Point and nonpoint pollution. Mechanisms of degradation of pollutants. Soil as Chemical Time Bomb (BQT). Soil vulnerability to contamination. Compaction process, surface sealing and crusting. Artificial sealing process of the soil. Causes. Environmental effects. Study methodologies. Management Strategies and Practices

**7. Theme 07.- Desertification (SECTION I: MANAGEMENT AND SOIL CONSERVATION)**

Global problem of land degradation in arid, semiarid and dry sub-humid. Definition and causes. Triggers. Major processes involved in desertification. Desertification in the Mediterranean area. Effects. Evaluation. Measures to control and fight against desertification



**8. Theme 08.- Evaluation and planning of land use (SECTION I: MANAGEMENT AND SOIL CONSERVATION)**

Perspectives in soil evaluation: Productive vs. environmentalism. Study methods. Evaluation parameters intrinsic and extrinsic. Systems of ability and competence. Methodological approaches to land use planning. The planning of land uses in the Mediterranean

**9. Theme 01.- Basic concepts in the management of water resources: Environmental and economic indicators (SECTION II: MANAGEMENT AND WATER CONSERVATION)**

Pressures and impacts on water use. Economic and environmental value of water. Water market and its regulation. Urban growth and supply requirements. Guarantee and security of supply. Situation of agricultural irrigation.

**10. Theme 02.- Basic legislation on water: Water Framework Directive (SECTION II: MANAGEMENT AND WATER CONSERVATION)**

Institutional framework. Shared responsibilities in an autonomous State. Basic organizations of the water Administration. Coordination requirements. Implementation of measures for legislation compliance. Study of costs and quantification of the benefits of the measures. Valuation of environmental externalities.

**11. Theme 03.- Optimal water management: resource availability, type of use, cost and quality requirements (SECTION II: MANAGEMENT AND WATER CONSERVATION)**

Tools for water management. Integration of socioeconomic and environmental variables in the management models. Adoption of measures in the correction of water deficits.

**12. Theme 04.- Hydrological planning: River Basin Plans (SECTION II: MANAGEMENT AND WATER CONSERVATION)**

Watershed delineation. Objectives and structure of the River Basin Plans. Availability of resources and types of uses at basin level. Cost recovery of water services. Administrative management and coordination of competencies in a river basin.

**13. Theme 05.- Conventional water resources: surface water and groundwater (SECTION II: MANAGEMENT AND WATER CONSERVATION)**

Uneven territorial use of resources. Criteria for the exploitation of aquifers. Influence of climate change. Cost of the resource and payment criteria. Distribution networks and water quality.



**14. Theme 06.- Non-conventional water resources, desalination and reuse of reclaimed water (SECTION II: MANAGEMENT AND WATER CONSERVATION)**

Basics of desalination. Cost of the process and environmental impact. Advantages of desalination. Concept of reuse. Treatment of wastewater and effluent quality criteria. Legal aspects and types of uses of reclaimed water. Replacement of traditional resources for reclaimed water. Need for agreements between local authorities and communities of irrigators. Role of the Administration.

**15. Theme 07.- Urban water demand: domestic and industrial use (SECTION II: MANAGEMENT AND WATER CONSERVATION)**

Distribution of competences and private suppliers. Water consumption and pricing. Cost-saving measures. Quality of the resource and the service.

**16. Theme 08.- Demand for water in agriculture: irrigation efficiency (SECTION II: MANAGEMENT AND WATER CONSERVATION)**

Crop water requirements. Irrigation systems. Resource productivity and price fixing. Application of historical rights. Security of supply in times of drought.

**17. Theme 09.- Optimal water management: resource availability, type of use, cost and quality requirements (SECTION II: MANAGEMENT AND WATER CONSERVATION)**

Tools for water management. Integration of socioeconomic and environmental variables in the management models. Adoption of measures in the correction of water deficits.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	40,00	100
Classroom practices	10,00	100
Laboratory practices	6,00	100
Tutorials	4,00	100
Development of group work	5,00	0
Development of individual work	20,00	0
Study and independent work	10,00	0
Preparing lectures	35,00	0
Preparation of practical classes and problem	10,00	0
Resolution of case studies	10,00	0
<b>TOTAL</b>	<b>150,00</b>	



## TEACHING METHODOLOGY

**This will be done in groups**

### CLASROOM THEORETICAL

### CLASROOM PRACTICAL

Use of various analytical tools in the management of the water

Application of the methodology of cost-benefit for different uses of water

Analysis of the economic and environmental viability of water reuse project

Study and resolution of practical cases.

### LABORATORY PRACTICAL WORKS

Laboratory practical works are carried out related to the soil degradation, management and conservation.

### SEMINARS

The European Strategy for Soil Protection

The National Action Plan to Combat DesertificationJúcar River Basin Authority

Wastewater Management Authority (EPSAR)

Urban Water Supplier

**will be carried out individually or in groups smaller than the previous activities.**

### TUTORING

Resolve questions about issues or problems proposed to students related to the subject)



## MONITORING

Monitoring of the course work

*It provides the student with teaching material and selected bibliography in the Virtual Classroom of the matter.*

## EVALUATION

During the development of the subject, both theoretical and practical classes, there will be a:

1. Continuous Valuation of each student, based on regular attendance at classes and classroom activities, participation and degree of involvement in the process of teaching and learning and skills and attitudes displayed during the development of activities.
2. Evaluation practical activities from the preparation of reports (mandatory) and exhibits the results obtained with the interpretation thereof.

Both continuous assessment and evaluation of practical activities correspond to a maximum of 20% of the final grade. Attendance at practices and Seminaris is mandatory. Failure to pass the course, this assessment will be considered for the next course.

Evaluation of an objective test consisting of a written exam consisting of theoretical and practical issues. Corresponds to a maximum of 80% of the final taking overcome with 5 to count the other parties and pass the course.

The student must complete the compulsory activities before to apply for the advancement of the exam.

## REFERENCES

### Basic

- ANTOLIN, C. (1998): El suelo como recurso natural en la Comunidad Valenciana. Colección Territorio nº 8. Ed. Generalitat Valenciana, Valencia
- LÓPEZ BERMÚDEZ F. (2002): Erosión y desertificación. Heridas de la tierra. Nivola libros y ediciones SL. Madrid 189 pg





- MAPA (1994): Métodos oficiales de análisis. Suelos, aguas y fertilizantes. Ministerio de Agricultura, Pesca y Alimentación. Madrid.
- MORGAN, R.P.C. (1997): Erosión y conservación del suelo. Ed. Mundi-Prensa. Madrid. 343 pg
- NEBEL, B. J.; WRIGTH, R. T. (1999): Ciencias ambientales. Ecología y desarrollo sostenible. Prentice Hall hispanoamericana. México
- PORTA, J.; LÓPEZ-ACEVEDO, M. Y ROQUERO, C. (2003): Edafología para la agricultura y el medio ambiente. Ed. Mundi-Prensa. Madrid. 929 pg.
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- PIERZYNSKI, G.M., J.T. SIMS, AND G.F. VANCE. (2000): Soils and Environmental Quality (Second Edition). CRC Press, Boca Raton, FL. 459 pg
- POCH, R.M. (1993): Técnicas de conservació de sols. Prom. y Pub. Univ. Univ. Lleida
- TAN, K. H. (2000): Environmental Soil Science. Marcel Dekker. New York. 480 pg
- AGUILERA KLINK, F. (1996): La economía del agua (2ª edición), Ministerio de Agricultura, Pesca y Alimentación, Madrid.
- BALAIRON, L. (2002): Gestión de recursos hídricos. Universidad Politécnica de Catalunya
- MINISTERIO DE MEDIO AMBIENTE (2000): Libro blanco del Agua en España, Madrid
- MULERO, A. (1999): Introducción al Medio Ambiente en España. Ariel. Barcelona
- OLCINA CANTOS J. (2002): Planificación Hidrológica y Recursos de Agua No Convencionales en España. Insuficiencias hídricas y Plan Hidrológico Nacional. Edición de A. Gil Olcina y A. Morales Gil. Caja de Ahorros del Mediterráneo, Alicante.
- RICO AMORÓS, A. M. Y OTROS (1998): Depuración, desalación y reutilización de aguas en España, Oikos Tau.
- RICO AMORÓS, A.M. Y HERNÁNDEZ HERNÁNDEZ, M. (2007): Ordenación del territorio, escasez de recursos hídricos, competencia de usos e intensificación de las demandas urbano-turísticas en la Comunidad Valenciana, Documents d'anàlisi geogràfica, 51, pags. 79-109.
- WINPENY, J., HEINZ, I. AND KOO-OSHIMA, S. (2010): The wealth of waste: the economics of wastewater use in agriculture. FAO Water Reports 35.

#### **Additional**

- [http://ec.europa.eu/environment/soil/pdf/com\\_2006\\_0232\\_es.pdf](http://ec.europa.eu/environment/soil/pdf/com_2006_0232_es.pdf)  
<http://edafologia.ugr.es/introeda/tema00/progr.htm>  
<http://www.unex.es/edafo/>  
<http://soil.gsfc.nasa.gov/>  
<http://esb.aris.sai.jrc.it/>



- AEAS (Asociación Española de Abastecimiento y Saneamiento) (2010): El Suministro de Agua Potable y Saneamiento en España.
- Directiva 2000/60/CE del Parlamento Europeo y del Consejo, de 23 de octubre de 2000, por la que se establece un marco comunitario de actuación en el ámbito de la política de aguas.
- Ministerio de Medio Ambiente (2001): Plan Hidrológico Nacional. Volúmenes 2, 4 y 5.
- Instituto de Estudios Económicos (2001): "La economía del agua en España", Revista del IEE, nº 4, 2001.
- Rico, A. (2002). Insuficiencia de Recursos Hídricos y Competencia de Usos en la Comunidad Valenciana, Boletín de la A.G.E. nº 33.

## **ADDENDUM COVID-19**

**This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council**

Como norma general, la modalidad de docencia se adaptaría a la situación sanitaria del momento y a lo que las autoridades sanitarias y académicas acuerden en este sentido.

### **1 Contents**

The contents initially presented in the Course Guide are maintained.

### **2. Workload and temporary planning**

The amount of work does not change.

The activities to be carried out are basically those specified in the Guide.

The time planning is maintained in accordance with the academic calendar.

### **3. Teaching methodology**

#### **a) Theory classes:**

The hybrid teaching model derived from COVID\_19 is applied with 50% of presence in the classroom with synchronous retransmission.

#### **b) Problems Classes and Classroom Tutorials**

Groups remain unchanged.

#### **c) Laboratory practices:**



In the hybrid model, the groups are further divided to reduce the occupation of the laboratory. Material is provided prior to the practice for its preparation. In addition, tasks will be requested, to be carried out individually, with the data of experimental results, as well as the writing of a memory of the practices.

If the evolution of the situation derived from COVID-19 forces the university and health authorities to reduce / suspend attendance that has been included in this addendum, the following measures will be taken:

a) **The activities programmed in the classroom with the hybrid model** will be carried out on-line through a synchronous online connection with Blackboard Collaborate (BBC) according to the scheduled time. Students will have the teacher's presentation in Powerpoint and various support material posted in the Virtual Classroom.

b) **The activities programmed face to face** will be carried out on-line and maintained in the programmed weeks, but would be replaced by the following methodologies:

Classroom tutorials and laboratory practices:

- For classroom tutorials, Tasks would be assigned in the corresponding section of the virtual classroom. These would be corrected by resolving doubts and errors by videoconference on the scheduled day of Tutoring for each group.
- For the Laboratory Practice Sessions, a script and / or asynchronous video would be provided in the Virtual Classroom with the instructions for carrying out an equivalent activity along with experimental data and support material to be able to carry out the tasks in a non-face-to-face way. Synchronous sessions could be scheduled where, guided by the teacher, the activities and questions would be worked on. With this, the students would elaborate a memory presented by means of the option "task" of the Virtual Classroom, for its later evaluation.

a) **Office tutorials and doubts** the following methodologies would be used:

-Asynchronous forums in Virtual Classroom

-Direct teacher-student communication through institutional mail

#### **4. Evaluation**

What is included in the evaluation section and the distribution of the marks/grade are maintained. The written test will represent 80% of the grade. Continuous assessment and practical activities will account for the other 20%.

It is specified that a minimum grade of 4 must be obtained in each part of the course to take into account continuous assessment and to be able to pass the course. Not reaching this minimum grade in any of the parts will result in the failure of the entire subject. To pass, an average of 5 will be required between both parties.



In the event that the written exams could not be face-to-face, they would be held 'on-line' with a limited time using the tools available in the Virtual Classroom.

**The specific details of the adaptation to the situations that may arise will be supervised by the CAT and will be communicated to the students through the Virtual Classroom**

## **5. Bibliography**

References from the original teaching guide are maintained and can be consulted online through the UV library