



Faculty of Experimental Sciences

## GENERAL SPECIFICATIONS

COURSE 2023-24

DEGREE IN ENVIRONMENTAL SCIENCES

## Subject Data

Name:

HIDROLOGÍA Y EDAFOLOGÍA AMBIENTAL

English name:

ENVIRONMENTAL HYDROLOGY AND SOIL SCIENCE

Code:

757709213

Type:

Compulsory

Hours:

	Total	In class	Out class
Time distribution	150	60	90

ECTS:

Standard group	Small groups			
	Classroom	Lab	Practices	Computer classroom
	4		2	

Departments:

Earth Sciences

Knowledge areas:

External Geodynamic

Year:

2023-24

Semester

Second

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**TEACHING STAFF**

<b>Name:</b>	<b>E-mail:</b>	<b>Telephone</b>
Carlos Ruiz Cánovas	carlos.ruiz@dgeo.uhu.es	959-219870
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**Others Data (Tutoring, schedule...)**

Office hours:

Prof. C. Ruiz Cánovas: Tuesdays and Wednesdays from 10:00 to 13:00 (Experimental Sciences Building, module 2 -yellow doors-, floor 3)

Prof. M. Olías Álvarez: Mondays from 9:00 to 10:00 and from 12 :00 to 14:00 and Wednesday from 9:00 to 12:00 (Experimental Sciences Building, module 2 -yellow doors-, floor 3)

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### SPECIFIC INFORMATION OF THE COURSE

#### I. Contents description:

##### I.1 In English:

This subject provides the student with the basic knowledge necessary to understand two very important issues in any environmental study: soil and water. The main problems affecting these resources (pollution, water overexploitation, soil erosion, etc.) are also addressed.

##### I.2 In Spanish:

Esta asignatura proporciona al alumno los conocimientos básicos necesarios para la gestión de dos importantísimos aspectos en cualquier estudio medioambiental: los suelos y los recursos hídricos. También se tratan los principales problemas que afectan a estos recursos (contaminación, sobreexplotación de recursos hídricos, erosión del suelo, etc.).

#### 2. Background:

##### 2.1 Situation within the Degree:

Second semester, third course

##### 2.2 Recommendations

No formal prerequisites are demanded but students should have a basic theoretical knowledge of geology, mathematics and chemistry.

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### 3. Objectives (as result of teaching, or skills or abilities and knowledge):

The main objectives are:

To know the hydrological cycle in detail, characteristics of surface waters and groundwaters, basic aspects of water resources management, problems of water pollution and non-conventional water resources.

To know the basic processes of soil formation, its constituents, its physicochemical properties, classification and the main challenges related to soils, mainly erosion and pollution.

### 4. Skills to be acquired

#### 4.1 Specific Skills:

- Ability to apply the basic principles of Physics, Chemistry, Mathematics, Biology and Geology to knowledge of the Environment.
- Ability to manage and optimize the use of energy.
- Ability to assess and prevent environmental risks.
- Capacity for planning, management and conservation of goods, services and natural resources.
- Ability to use computer tools and statistics applied to the environment atmosphere.
- Capacity in the elaboration and interpretation of thematic cartographies.
- Ability to analyze the Environment as a system, identifying the factors, behaviors and interactions that shape it.
- Ability to assess the interaction between the natural environment and society.

#### 4.2 General, Basic or Transversal Skills:

- Students have to demonstrate possessing and understanding knowledge in an area of study that starts from the base of general secondary education, and is usually found at a level which, although it is supported by advanced textbooks, also includes some aspects that imply insights from the cutting edge of your field of study.
- That students know how to apply their knowledge to their work or vocation in a way professional and possess the competencies that are usually demonstrated through the preparation and defense of arguments and problem solving within their area of study.
- That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant issues of a social, scientific or ethical nature.
- That students can transmit information, ideas, problems and solutions to a both specialized and non-specialized public.
- That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.
- Analysis and synthesis capacity.
- Teamwork.
- Critical reasoning.
- Motivation for quality.
- Sensitivity towards environmental issues.
- Use of the Internet as a means of communication and as a source of information.
- Ability to understand the language and proposals of other specialists.
- Computer knowledge related to the field of study.
- Problem solving.

### 5. Training Activities and Teaching Methods

#### 5.1 Training Activities:

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Students will have to solve some activities for themselves. These activities will consist in: 1) resolving individually problems similar to carried out in classroom and 2) writing an essay and giving a short talk before the end of semester about a scientific paper or covering some topics not discussed in the classroom

### 5.2 Teaching Methods::

Theoretical lessons will take the form of a weekly lecture illustrated with Power Point presentations or other means, which can be consulted at the virtual UHU (Moodle). Lectures which will be conducted in an inter-active manner and actively encourage student discussion and dialogue. The problem sessions will be devoted to apply and reinforce some of the theoretical concepts. Students will have to solve in class some exercises with the help of the instructor.

Students are expected to attend classes regularly.

### 5.3 Development and Justification:

## 6. Detailed Contents

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### Hydrology

1. The hydrological cycle. Water in the soil. Precipitation. Evaporation and Evapotranspiration. Infiltration. Runoff (1 week).
2. Surface hydrology. Watersheds. Rivers. Lakes and reservoirs. Environmental flow regime. (1 week).
3. Hydrogeology. Hydrogeological behavior of materials. Law of Darcy. Hydrodynamic parameters. Overexploitation. (1 week)
4. Water pollution. Natural composition of water. Contaminant agents. Quality indices (1 week).
5. Introduction to the management of water resources. Concepts on water management. Water quality depending on its use. (1 week)
6. Non-conventional water resources. Desalination. Reuse of wastewater. (1 week)

### Soil Science

7. Soil formation. Processes and forming factors. The soil profile. Horizons (1 week)
8. Soil constituents. Solid phase: inorganic and organic. Liquid phase. Gas phase (1 week)
9. Soil properties. Physic properties. Physico-chemical properties (1 week)
10. Soil classifications. Basics of soil taxonomy (0.5 week). Land evaluation
11. Soil degradation: types and evaluation (1 week)
12. Soil erosion. Basic concepts. Forms of water erosion. Conditioning factors. USLE: Universal equation of soil loss. Wind erosion. Desertification. (1 week)
13. Soil contamination. Contaminant agents. Salinization. Phytosanitary products. Heavy metals. Acid rain. Mining activities (1 week)
14. Soil remediation. Containment techniques. Extraction techniques. Transformation techniques. Phytoremediation (0.5 week)

## 7. Bibliography

### 7.1 Basic Bibliography:

- Brady, N.C. y Weil R.R. (2004). Elements of the nature and properties of soils. Ed. Prentice Hall.
- Cech, T.V. (2005). Principles of water resources. History, development, management and policy. John Wiley & Sons.
- Fetter, C.W. (2001). Applied Hydrogeology. Ed. Prentice-Hall,
- Gordon, N.D. McMahon, T.A., Finlayson, B.L., Gippel, C.J. y Nathan, R.J. (2004). Stream hydrology. An introduction for ecologists. John Wiley & Sons.
- Pierzynsky, G.M., Sims, J.T. y Vance, G.F. (2005). Soils and environmental quality. CRC Press, Boca Ratón. USA.

### 7.2 Additional Bibliography:

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For each lesson, specific bibliography will be provided.

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### 8. Systems and Assessment Criteria

#### 8.1 System for Assessment:

There are two options:

- Continuous assessment (see 8.2)
- Single final evaluation (see 8.3)

#### 8.2 Assessment Criteria and Marks:

##### 8.2.1 Examinations Convocatory I

There will be a theory exam and a practical exam. The theory exam will account for 35% of the final mark, the practical exam 25% and the directed activities 40%. In addition, the students they can get an additional 10% if they regularly attend the face-to-face classes and participate actively. The exam of the theoretical part will consist of two questions to develop and five short questions. The practical exam will be done after the theoretical one and will consist of a practical similar to those carried out in class (or two shorter practices). For the practical exam there will be to be provided with a pencil, ruler and calculator. To make an average it will be necessary to obtain more than a four in each of the parts.

##### 8.2.2 Examinations Convocatory II

The same that Convocatory I

##### 8.2.3 Examinations Convocatory III

The same that Convocatory I



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### 8.2.4 Extraordinary Convocatory

The same that Convocatory I

### 8.3 Single Final Evaluation:

There will be a theory exam and a practical exam. The theory exam will account for 60% of the final mark and the practical one 40%. The exam of the theoretical part will consist of two questions develop and five short questions. The practical exam will be done after the theory and It will consist of a practice similar to those carried out in class (or two shorter practices). For him practice exam will have to be provided with a pencil, ruler and calculator. To make average there will be than get more than a four over ten in each of the parts.