

Academic Year/course: 2022/23

## 28758 - Water Resources

### Syllabus Information

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**Academic Year:** 2022/23

**Subject:** 28758 - Water Resources

**Faculty / School:** 175 - Escuela Universitaria Politécnica de La Almunia

**Degree:** 423 - Bachelor's Degree in Civil Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** Second semester

**Subject Type:** Optional

**Module:**

## 1. General information

### 1.1. Aims of the course

The integrated management of water resources is one of the most outstanding aspects in the fight against Climate Change and for a sustainable development. The first institution that established this integrated management was the Confederación Hidrográfica del Ebro in 1926, since then it is an example to be imitated that is spreading throughout the world and that was ratified in the Water Framework Directive of the European Union. The importance of the adequate management of these resources is increasingly more pressing due to the circumstances of Climate Change, and it is necessary to have technicians with sufficient knowledge to deal with these problems. This course provides the necessary knowledge for the optimal management of resources.

Estos planteamientos y objetivos están alineados con los siguientes Objetivos de Desarrollo Sostenible (ODS) de la Agenda 2030 de Naciones Unidas (<https://www.un.org/sustainabledevelopment/es/>), de tal manera que la adquisición de los resultados de aprendizaje de la asignatura proporciona capacitación y competencia para contribuir en cierta medida a su logro:

**Goal 6:** Ensure access to water and sanitation for all

**6.4** By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

**6.5** By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

**6.6** By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

**6.B** Support and strengthen the participation of local communities in improving water and sanitation management

**Goal 11:** Make cities inclusive, safe, resilient and sustainable

**11.B** By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels

**Goal 12:** Ensure sustainable consumption and production patterns

**12.2** By 2030, achieve the sustainable management and efficient use of natural resources

### 1.2. Context and importance of this course in the degree

This course forms part of the Degree in Civil Engineering taught by EUPLA. It is part of the group of subjects that make up the module called Specific Training of the itinerary in Hydrology. It is a subject of third course located in the second semester and compulsory (OB), with a teaching load of 6 ECTS credits. However, this

subject can be taken as an optional subject within the formative path of Civil Constructions.

### 1.3. Recommendations to take this course

There is no special recommendations to take this course. However, the contents handled will require the skills and abilities acquired in the following subjects, so it is strongly recommended to be enrolled (or have passed) in them:

- Ampliación de Hidráulica e Hidrología: This provide knowledge of the basic concepts that will be handled in the development of the course.
- Ampliación de Hidrología Superficial: Although it is developed in parallel to this subject, the concepts shown are complementary to it.
- Ampliación de Hidrología Subterránea: Although it is developed in parallel to this subject, the concepts shown are complementary to it.

## 2. Learning goals

### 2.1. Competences

**Students are guaranteed to gain at least the following general and mandatory skills:**

#### General skills:

- **G1.** Comprehension and mastery of fundamental knowledge in the area of study and the ability to apply this fundamental knowledge to specific tasks of an environmental professional
- **G2.** Communication and argumentation, oral and written, of stances and conclusions, to expert audiences or broadcasting and information to non-expert audiences
- **G3.** Capacity to solve problems, both generic ones and ones typical of the area, using the interpretation and analysis of relevant data and evidence, the issuing of evaluations, decisions, reflections and pertinent diagnoses, with the consideration suitable to scientific, ethical or social aspects
- **G4.** Capacity of consistent decision-making
- **G5.** Capacity of critical reasoning (analysis, synthesis and assessment)
- **G6.** Capacity to apply theoretical knowledge to an analysis of situations
- **G7.** Mastery of IT applications related to the field of study, as well as the use of the internet as medium and source of information
- **G8.** Capacity to autonomously organize and plan work and manage information
- **G9.** Capacity to work on a team, in particular teams of an interdisciplinary and international nature typical of the work in this field
- **G10.** Capacity to lead, to organize working teams and fundamental skills in interpersonal relationships
- **G11.** Capacity of communication, argumentation and negotiation both with specialists of the area as well as non-experts on the subject
- **G12.** Ethical commitment to all aspects of one's professional performance
- **G13.** Capacity of autonomous learning and self-assessment
- **G14.** Creativity, initiative and enterprising spirit
- **G15.** Capacity to adapt to new situations
- **G16.** Motivated by quality
- **G17.** Sensitivity towards environmental themes
- **G18.** Capacity to possess and understand knowledge in an area of ??study that starts from the general secondary education base, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that involve knowledge from the avant-garde. from your field of study
- **G19.** Ability to apply their knowledge to their job or vocation in a professional way, and possess the competencies that are usually demonstrated through the elaboration and defense of arguments and problem solving within their area of ??study
- **G20.** Ability to collect 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
- **G21.** Ability to transmit information, ideas, problems and solutions to both specialized and non-specialized

audiences

- **G22.** Develop those learning skills necessary to undertake further studies with a high degree of autonomy
- **G23.** Competences to know and understand respect for fundamental rights, equal opportunities between women and men, universal accessibility for people with disabilities, and respect for the values ??of the culture of peace and democratic values.
- **G24.** Competences to promote entrepreneurship
- **G25.** Knowledge of information and communication technologies (ICT)

#### **Mandatory skills:**

- **EH1.-** Knowledge and ability to design and size hydraulic works and installations, energy systems, hydroelectric utilization, and planning and management of surface and underground hydraulic resources

## **2.2. Learning goals**

### **The student, to pass this subject, must demonstrate the following results:**

- He/she will know the different regulation tools and their optimal way of use.
- He/she will be able to carry out the necessary studies for the planning and management of water resources.
- He/she will know how to determine the demands for the use of water from different origins (domestic, industrial, agricultural).
- He/she will be able to analyze situations derived from incorrect water resource management strategies (such as situations of water deficit), as well as suggest possible solutions

## **2.3. Importance of learning goals**

This subject has a marked engineering character, that is, it offers training with application content and immediate development in the labor and professional market. Through the achievement of the relevant learning results, the necessary capacity for planning and managing water resources is obtained.

# **3. Assessment (1st and 2nd call)**

## **3.1. Assessment tasks (description of tasks, marking system and assessment criteria)**

### **The students must demonstrate that they have achieved the expected learning outcomes through the following assessment activities:**

The evaluation must be understood as a continuous and individualized process along the entire teaching-learning period, prioritizing the capacities and abilities of each student, as well as their performance. Following the spirit of the Bologna Treaty, regarding the degree of involvement and continued work of the student throughout the course, the evaluation of the subject considers the continuous evaluation system as the most consistent to be in line with the guidelines set by the new framework of the EHEA.

The student evaluation process will include two modes of action:

- A **continuous evaluation system**, which will be carried out throughout the learning period.
- A **global assessment test** that reflects the achievement of learning results at the end of the teaching period.

The **continuous evaluation system** will have the following group of qualifying activities:

- **1.- Preparation of an individual work** selected between together the student and the teacher, in which one or more of the aspects covered in the subjects of the subject will be developed. This activity will be valued between 0 and 10 points. The qualification obtained in the work will contribute with 20% of the global mark of the subject.
- **2.- Continuous assessment tests:** The student will take a total of two compulsory written tests in the continuous assessment system, which will be distributed throughout the course, one halfway through and the other at the end of the semester. These tests will collect theoretical questions and exercises on the corresponding topics. This activity will globally contribute with 80% to the final grade for the course.

To opt for the continuous assessment system, the student must attend at least 80% of the class activities, including practicals and technical visits.

The evaluation criteria to be followed for the activities of the continuous evaluation system are:

In case of not passing in this way, the student will have two calls to do so, but this time under the modality of global assessment test. In addition, the student who has passed the subject through this dynamic, may also choose the final evaluation to increase grade but never to lower.

## **Final assessment global test**

The student will be able to opt for this modality when, due to his personal and reasonably justifiable situation, he cannot adapt to the rhythm of work required in the continuous evaluation system, or when he has suspended or wants to upload a grade having participated in this last evaluation methodology. As in the continuous assessment methodology, the global final assessment test aims to check if the learning results have been achieved, as well as contributing to the acquisition of the various skills.

The global final evaluation test in both calls will include the following group of qualifying activities:

- **Written test:** Due to the type of subject, the most appropriate type of test consists of solving exercises of theoretical and/or practical application with similar characteristics to those solved during the conventional development of the subject, together with the answer to brief theoretical questions.

## **4. Methodology, learning tasks, syllabus and resources**

### **4.1. Methodological overview**

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, practice sessions, tutorials, and autonomous work and study.

A strong interaction between the teacher/student is promoted. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

The approach, methodology and assessment of this guide are intended to be the same for any teaching scenarios. They will be adapted to the social-health situation at any particular time, as well as to the instructions given by the authorities concerned.

### **4.2. Learning tasks**

This course is organized as follows:

- **Lectures:** The theoretical concepts of the course are explained and illustrative examples are developed as a support to the theory when necessary.
- **Practice sessions:** Problems and practical cases are carried out, complementary to the theoretical concepts studied.
- **Tutorials:** Carried out giving individual, personalized attention with a teacher from the department; these tutorials may be on-site or online.
- **Autonomous work and study**
  - Study and understanding of the theory taught in the lectures.
  - Understanding and assimilation of the problems and practical cases solved in the practical classes.
  - Preparation of seminars, solutions to proposed problems, etc.
  - Preparation of the written tests for continuous assessment and final exams.

### **4.3. Syllabus**

This course will address the following topics:

- 1.- Hydrological planning
- 2.- Water Resources. Basic concepts
- 3.- Uses of water. Basic concepts
- 4.- Domestic use of water
- 5.- Industrial use of water
- 6.- Agricultural use of water
- 7.- Water quality based on usage
- 8.- Guarantee of water demand
- 9.- Management of surficial waters
- 10.- Management of ground waters
- 11.- Water reuse
- 12.- Water desalination
- 13.- Extreme events: floodings

#### 4.4. Course planning and calendar

This course has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the course file in the Accreditation Report of the degree, taking into account the level of experimentation considered for this course is moderate.

<b>Activity</b>	<b>Weekly school hours</b>
Lectures	4
Other Activities	6

Nevertheless, the previous table can be shown in greater detail, taking into account the following overall distribution:

? 52 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.

? 4 hours of written assessment tests, two hours per test.

? 90 hours of personal study, divided up over the 15 weeks of the 2<sup>nd</sup> semester.

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of EUPLA website and Moodle.

#### 4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28758>