

### COURSE NAME

Name: **HYDROLOGY**

Code: 101153

Curriculum: **DEGREE IN CIVIL ENGINEERING**

Year: 3

Subject: DESIGN AND MANAGEMENT OF HYDRAULIC AND HYDROELECTRIC SYSTEMS

Nature: OBRIGATORY Duration: FIRST SEMESTER

ECTS Credits: 6

Classroom hours: 60

Face-to-face classroom percentage: 40%

Non-contact hours: 90

### FACULTY DETAILS

Name: POLO GÓMEZ, MARÍA JOSÉ (Coordinator)

Department: AGRONOMY

Area: HYDRAULIC ENGINEERING

Location of the office: Edif. Leonardo da Vinci, Campus de Rabanales

E-Mail: mjpolo@uco.es

Phone number: 957212662

Name: LÓPEZ SÁNCHEZ, MANUEL

Department: MECHANICS

area: MINERAL PROSPECTION AND INVESTIGATION

Location of the office: EPS Belmez

E-Mail: um1losam@uco.es

Phone number: 957213042

Name: TORRALBO MUÑOZ, PEDRO

Department: AGRONOMY

Area: HYDRAULIC ENGINEERING

Location of the office: Edif. Leonardo da Vinci, planta primera, Campus de Rabanales

E-Mail: p12tomup@uco.es

Phone number: 957212662

### SKILLS

CB1	Have and understand specific knowledge of the field of study of mining engineering.
CB2	Have and understand current and cutting-edge knowledge of the field of mining engineering.
CB3	Be able to apply the knowledge acquired in professional contexts and to elaborate and defend arguments in the field of knowledge of mining engineering.
CB7	Possess the learning skills necessary to undertake studies with a high degree of autonomy.
CU2	Know and refine the user level of ITs.
CEH1	Knowledge of and ability to design and dimension hydraulic works and facilities, energy systems, hydroelectric facilities, and the planning and management of surface and groundwater hydraulic resources.

### OBJECTIVES

The general aim of this course is that, when completed, the students will have understood and learnt about the water cycle and the basic principles of water and soil conservation. This general aim can be achieved through the following specific objectives:

- Be familiar with and understand the hydrological processes in the different tanks in the cycle.
- Quantify water flows between tanks in order to calculate hydrological design parameters and variables.
- Understand the meaning of "basin" and its role as a regional unit in hydrological planning and integrated water resource management.
- Be familiar with and understand the interaction between water and soil, and the basic aspects that condition the quality of these.

In a cross-cutting manner, the skills in this subject contribute to the Sustainable Development Goals (SDGs). The SDGs aim to achieve equality between people, protect the planet and ensure prosperity. In 2015, 193 countries committed to the United Nations 2030 Agenda and its 17 SDGs, and to achieving them by 2030.

In particular, the following SDGs are highlighted:

- 5.B. Use of technology and access to ICT.
- 6.3. Water quality. Pollution and wastewater.
- 6.4. Efficient use of water resources.
- 6.5. Comprehensive management of water resources.
- 6.6. Water-related ecosystems (forests, mountains, wetlands, rivers, aquifers and lakes).
- 6.A. Management capacity building.
- 13.2. National policies, strategies and plans.

## CONTENTS:

### 1. Theoretical contents

#### I. SURFACE HYDROLOGY

- TOPIC 1.- WATER AND SOIL RESOURCES
- TOPIC 2.- WATER IN THE ATMOSPHERE
- TOPIC 3.- WATER IN THE SOIL
- TOPIC 4.- SURFACE HYDROLOGY
- TOPIC 5.- HYDROLOGICAL DESIGN
- TOPIC 6.- HYDROLOGICAL MODELS
- TOPIC 7.- PRINCIPLES OF WATER AND SOIL CONSERVATION

#### II. GROUNDWATER HYDROLOGY

- TOPIC 1.- BASIC CONCEPTS OF GROUNDWATER HYDROLOGY.
- TOPIC 2.- GROUNDWATER PROSPECTING USING GEOPHYSICAL TECHNIQUES. DIRECT CURRENT GEOELECTRIC METHODS.
- TOPIC 3.- DRILLING SYSTEMS FOR GROUNDWATER ABSTRACTION. PERCUSSION, ROTARY AND COMPRESSED AIR DRILLING SYSTEMS.
- TOPIC 4.- MAINTENANCE AND REHABILITATION OF BOREHOLES.
- SUBJECT 5.- EVALUATING AQUIFERS THROUGH PUMPING TESTS.

### 2. Practical contents.

#### I. SURFACE HYDROLOGY

- 1.-HANDLING AND REPRESENTING HYDROLOGICAL DATA IN SPREADSHEETS
- 2.-MEASURING INFILTRATION AND DETERMINING SATURATED HYDRAULIC CONDUCTIVITY IN THE FIELD
- 3.-CALCULATING WATER INFILTRATION INTO THE SOIL
- 4.-FLOW CIRCULATION IN A SPREADSHEET
- 5.-HYDROLOGICAL ANALYSIS USING SIG: INTRODUCTION TO SIG, WATERSHED MAPPING, HYDROGRAPH CALCULATION

#### II. GROUNDWATER HYDROLOGY

- 1.- ANALYSING FLOODS USING THE HEC-RAS AND CAUMAX APPLICATIONS.
- 2.- INTERPRETING SEV AND ELECTRICAL TOMOGRAPHY.
- 3.- INTERPRETING PUMPING TESTS.