

## 28958 - Irrigation Networks

### Syllabus Information

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**Academic year:** 2024/25

**Subject:** 28958 - Irrigation Networks

**Faculty / School:** 201 - Escuela Politécnica Superior

**Degree:** 583 - Degree in Rural and Agri-Food Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

Redes de Riego provides practical technical training in professional skills related to irrigation system modernization projects, including network design and management. The approach that is taken systematically exploits professional IT tools, and is oriented towards the demands of the labor market.

It deals with the optimized design, analysis and management of pressurized distribution networks that transport water, from the primary sources of supply,... to the intakes of the plots where irrigation applications occur, including the aspects related to pumping equipment and its regulation. The required components are described and evaluated and their selection is justified.

It is required to have passed the compulsory course Hydraulics.

These approaches and objectives are aligned with the Sustainable Development Goals, SDGs, of the 2030 Agenda Goal 6: Ensure the availability of water and its sustainable management and sanitation for all.

### 2. Learning results

Capacity of:

To know how to particularize the basic principles of hydraulics in the context of pressurized fluid distribution networks.

Design with optimization criteria (minimum cost) branched fluid distribution networks, fed both by gravity and direct pumping stations.

Calculate design flow rates of collective irrigation networks on demand with Clement's methodology.

Hydraulic and energetic analysis of distribution networks of any type (branched, meshed, with or without pumping).

Hydraulic and energetic management of distribution networks, preparation of optimal schedules, and undertaking changes, rehabilitations and refurbishments.

Designing pumping stations and their regulation with fixed and variable speed motors, as well as understanding of the structures of electricity tariff structures.

Master the use of computerized tools for engineering design and management of distribution networks (GESTAR).

Selection of components through physical catalogs, commercial and online applications, as well as compression of associated technical specifications.

To have criteria to assign parameters and coefficients for design and management of distribution systems.

Interpret the results of calculation processes and design and management tools and establish economic operating guidelines.

To contract electricity supplies in accordance with the operating guidelines of the distribution networks.

Apply the principles and techniques developed in the context of irrigation networks to other fluid distribution systems in rural, urban and agri-food industries.

Assess the sustainability of irrigation expansions and modernizations.

### 3. Syllabus

C1 Presentation and applications. Pressurized systems. ODS: Hydrological paradoxes

C2 Typology of distribution networks and uses. On-demand and shift systems

C3 Components: piping, valves and regulating elements.

C4 Calculation of design flow rates on demand and in shifts.

C5 Optimal sizing of branched networks.

C6 Pumping equipment, pumping and regulating stations

C7 Hydraulic and energy analysis of distribution networks.

C8 Management of collective networks.

#### **4. Academic activities**

##### **Lectures 30 h**

The topics are introduced through the presentation of concepts with the support of ppt, animations, interactive examples, professional experience, and with the active participation of the students.

##### **Problem solving and case 20 h**

Sessions for project and network management using the computer tools (GESTAR) provided in the term.

##### **Laboratory practice 10 h**

Training in the use of GESTAR's graphic, instrumental and accessory resources

##### **Teaching and other activities 24 h**

Development of course work.

##### **Study 60 h**

##### **Assessment tests: 6 h**

#### **5. Assessment system**

The assessment is preferably continuous, which requires the attendance to 80% of the classes and to pass the development of a practical course work on the design and management of an irrigation network, applying the contents of the subject syllabus and the computer tools in which it has been trained.

The Course Work consists of 4 or 5 deliveries of partial work that represents 50% of the grade, and a Final Report of integration, of technical type, which will be similar to the annex of hydraulic calculations of the project of an irrigation network, which represents another 50% of the grade. The results of each partial work and Final Report will be delivered in the format and date that will be indicated in due time.

In addition, the ability to respond to specific questions, participation in the discussions and following the classes will be valued and the follow-up of the lectures.

Global test as a whole. For students who do not satisfy the continuous evaluation process, either by lack of attendance , or by a grade lower than 5 in the Course Work, or if they wish to increase their grade, a finaltest will be called consisting of developing in person, for a maximum of 6 hours, a complete practical case of design and analysis using the computer tools taught during the course.

The success rates for the subject in the last three years are: 2020/21: 100%; 2021/22: 100%; 2022/23: 100%

#### **6. Sustainable Development Goals**

2 - Zero Hunger

6 - Clean Water and Sanitation