Universidad Zaragoza

Academic Year/course: 2024/25

28729 - Supply and Sanitation Systems for Construction Engineering

Syllabus Information

Academic year: 2024/25
Subject: 28729 - Supply and Sanitation Systems for Construction Engineering
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 423 - Bachelor's Degree in Civil Engineering
ECTS: 6.0
Year:
Semester: Second semester
Subject type: Compulsory
Module:

1. General information

Supply and sanitation networks are essential for the functioning of cities and new urban developments.

Investments in these areas in developing countries provide maximum returns in terms of improved living standards and increased gross domestic product.

The networks are not only made up of a series of pipes, but also require a series of complex installations for their correct operation: pumping, spillways, storm tanks, etc.

This subject provides the necessary knowledge for the design and operation of these networks.

2. Learning results

To fully understand the supply and sanitation systems, with all their criteria, elements, mechanisms and structures.

Handle the most common techniques for the calculation of supply and sanitation networks.

Drafting of supply and sanitation projects, even within the urban grid, thanks to the knowledge of the design, calculation and construction of these networks.

To select among the different materials available for the conduits the most suitable for your needs as well as the electromechanical mechanisms necessary for its operation.

3. Syllabus

Unit 1. General Procurement Concepts.

What is water. History of supply. Diseases associated with supply. Legislation. Elements of the supply networks . Phases of the supply studies.

Unit 2. Urban water consumption.

Supply flows. Origin of water. Design horizon. Analysis of the population and its growth. Evolution of the endowment. Actual consumption data and comparison with different variables. Urban consumption. Industrial consumption.

Demand forecasting. Losses. Seasonal variations. Daily variations. Peak and simultaneity coefficients. Unit 3. Calculation of distribution networks.

Fundamentals of Hydraulics. Flow in pipelines. Bernoulli's Theorem. Flow under pressure. Losses. Darcy. Prandtl.

Colebrook. Moody's Abaco. Manning. Hazen-Williams. Linear and localized loss coefficients. Mesh and branched networks. Non-permanent regime. Water hammer. Epanet. Allevi.

Unit 4. Materials and equipment for supply networks.

Elements in the supply network, design and calculation. Deposits. Piping. Valves. Suction cups. Pumping. Unit 5. Supply works project.

C

ontent of a project. Applicable regulations. Report and appendices. Planes. Pliego. Budget. Relative importance of the documents. Network design criteria. Layout criteria in plan and elevation. Zoning. Parallelisms. Criteria for trench selection.

Unit 6. Construction of supply works.

Applicable regulations. Previous operations. Transport and storage of materials. Piping installation. Safety in trenches. Anchor massifs. Pipe testing and trials. Factory works. Disinfection. quality assurance. Environment.

Unit 7. Maintenance and Management of the water distribution system.

General. Leakage management. Water not billed. Organization of a water management company. Indicators of management.

Unit 8. General Sanitation Concepts.

History. Evolution of objectives. Main problems. Regulations. Contamination. Network typology. Elements of a sanitation

network. Phases of a remediation study.

Unit 9. Urban hydrology.

Dry weather flow rates. Wastewater calculation allocations. Stormwater flows. Return period.

Water circulation. Definition of urban and natural watersheds.

Unit 10. Hydraulics of sewage networks.

Free sheet hydraulics. Hydraulics of large collectors. SWMM. The air problem in the networks. Unit 11. Materials and equipment for sewage networks.

General. Network elements. Piping. Catch basins and manholes. Spillways. Retention tanks. Storm tanks. Lamination tanks. Pumping stations. Capture of surface runoff. Complementary elements to the sewage system.

Unit 12. Sanitation works project.

Regulations. Pipelines. Mechanical calculation of pipelines. Spillways. Retention tanks. Pumping. Connections.

Valves and suction cups. Sinkholes. SUDS.

Unit 13. Construction of sanitation works.

Applicable regulations. Common elements with supply. Previous operations. Transportation and storage of the materials. Piping installation. Pipe testing and trials. Safety in trenches and pipelines.

Unit 14. Maintenance and Management of the Urban Drainage System.

Requirements and functions of integrated sanitation management. Network exploitation and operation. Quality of discharges to the network.

Effects on the environment. Water reuse. Debugging.

4. Academic activities

- Face-to-face activities:

- Theoretical classes: theoretical concepts of the subject and illustrative practical examples to facilitate understanding. Practical classes: problems and case studies to complement theoretical concepts.
- Support classes in the realization of projects: These practical classes are tutored by the professor, in small groups.
- Assessment tests.

- Non-face-to-face activities

- Study and assimilation of the theory presented in the lectures.
- Understanding and assimilation of problems and practical cases solved or proposed in the practical classes.
- Preparation of practical projects.
- Preparation of written evaluation tests

5. Assessment system

Continuous assessment system.

- **Individual activities. Projects**: The student will deliver two projects (supply and sanitation) that will be exposed and presented in class, addressing their classmates. A minimum of 5 out of 10 is required.

- **Written assessment tests**: written exams scored from 0 to 10 points. The final grade will be the average arithmeticmean of these tests, provided that there is no unit grade below 3 points.

Assessment activity	**Weighting**
Individual practices. Projects	40 %
Written assessment tests:	60 %

Prior to the first official exam, the teacher will notify each student whether or not he/she has passed the subject in the first exam function of the continuous assessment system.

Global assessment system.

- **Projects**: The student will deliver two projects (supply and sanitation) at the beginning of the global assessment test , as a sine qua non condition to pass the course. A minimum of 5 out of 10 is required.

Written exam: It will consist of a test containing questions and problems related to the topics explained throughout the subject. This test is graded from 0 to 10 points.

Assessment activity	**Weighting**
Projects	30 %

Written exam	70 %

For those students who have failed the continuous assessment system, but have passed the assignments, they will only have to take the written exam of the global assessment system.

6. Sustainable Development Goals

5 - Gender Equality
6 - Clean Water and Sanitation
11 - Sustainable Cities and Communities