

Academic Year/course: 2022/23

28729 - Supply and Sanitation Systems for Construction Engineering

Syllabus Information

Academic Year: 2022/23

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

1.1. Aims of the course

The subject and its expected results respond to the following approaches and objectives:

The water supply and sanitation networks are fundamental for the performance of cities and new urban developments. Investments in these areas in developing countries provide maximum returns on concepts such as improved living standards and increased gross domestic product.

The networks not only consist of a series of pipes, but also require a series of complex installations to work properly: pumps, spillways, storm tanks, etc.

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

These approaches and objectives are in line with the following Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), in such a way that the acquisition of the course learning outcomes provides training and competence to contribute to their achievement to some degree.

6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

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

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

9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

1.2. Context and importance of this course in the degree

The subject Water supply and sanitation systems in construction engineering, is part of the Degree in Civil Engineering taught by EUPLA, is part of the group of subjects that make up the module called Specific Training relating to the training itinerary of Civil Constructions. This is a compulsory third year course in the second semester (OB), with a teaching load of 6 ECTS credits. In addition, this subject can be taken with optional character in the formative itineraries of Hydrology and Urban Transport and Services.

This subject corresponds to a specific speciality of the profession of Civil Engineer suitable for the professional development of the graduate.

1.3. Recommendations to take this course

There are no prerequisites to take this course. However, the contents to be studied will require the skills and abilities acquired in the following subjects, mainly.

- Graphic Expression: The graphic resources are necessary to represent the technical solutions associated with the subject. CAD programs will be used.

- Geology: The definition of sanitation and water supply works requires a basic knowledge of geology.
- Geotechnics: The definition of the sanitation and supply works requires to know the basic concepts of geotechnics.
- Fundamentals of Hydraulic Engineering and Extension of Hydraulic and Hydrological Engineering: The concepts of these subjects are fundamental for developing the designs to be carried out during the course of the subject.
- Topography: Sanitation and water supply must be reflected in the real terrain, for this, the student should manage the topographic tools.
- Mathematics: Problem solving requires the application of equations, hypotheses and calculation strategies acquired in these subjects.

2. Learning goals

2.1. Competences

Knowledge and understanding of water supply, drainage and sanitation systems, as well as their dimensioning, construction and conservation of those system.

Combining basic and specialized engineering knowledge to develop and manage networks

Plan, budget, organize and manage aspects of sanitation, drainage and water supply

Apply basic knowledge of hydraulics and fluid mechanics

Among the competencies defined in the verification report, those related to this subject are the following:

E08. Knowledge and understanding of supply and sanitation systems, as well as their dimensioning, construction and maintenance.

G01. Capacity for organization and planning

G02. Problem solving capabilities

G03. Decision-making Capacity

G04. Ability to communicate orally and in writing in the native language

G05. Analysis and synthesis capacity

G06. Information management capability

G07. Ability to work in a team

G08. Capacity for critical thinking

G09. Ability to work in an interdisciplinary team

G10. Ability to work in an international context

G11. Improvisation and adaptation capacity to face new situations

G12. Leadership skills

G13. Positive social attitude towards social and technological innovations

G14. Ability to reason, discuss and present one's own ideas

G15. Ability to communicate through word and image

G16. Ability to search, analyze and select information

G17. Capacity for autonomous learning

G18. Possessing and understanding knowledge in an area of study that is at the core of general secondary education, and is usually at a level, which while supported by advanced textbooks, also includes some aspects involving knowledge from the cutting edge of their field of study.

G19. Apply their knowledge to their work or vocation in a professional manner and possess the skills that are usually demonstrated through the development and defence of arguments and problem-solving within their area of study.

G20. Ability to gather and interpret relevant data (usually within their area of study) to make judgements that include reflection on relevant social, scientific or ethical issues

G21. Convey information, ideas, problems and solutions to both specialized and non-specialized audiences

G22. Develop those learning skills necessary to undertake further study with a high degree of autonomy

G23. 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. Encourage entrepreneurship.

G25. Information and communication technology skills.

2.2. Learning goals

In order to pass this course, the student must demonstrate the following results...

He/she will have full knowledge of the water supply, drainage and sanitation systems, with all their criteria, elements, mechanisms and structures.

He/she will be able to handle the most common techniques for calculating water supply, drainage and sanitation networks.

He/she will have the necessary knowledge to carry out a water supply, drainage and sanitation projects and detail designs. He/she will be able to select the most suitable material for the pipes from the different available ones, as well as the electromechanical mechanisms necessary for their operation.

2.3. Importance of learning goals

This course has a marked engineering character. It offers a preparation with contents of immediate application in the labor and professional market. Through the achievement of the relevant learning results, the necessary capacity for the concept, design and operation of supply, drainage and sanitation systems is obtained.

3. Assessment (1st and 2nd call)

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

The student must demonstrate that he/she has achieved the intended learning outcomes through the following assessment activities

Assessment is a basic element in the entire teaching-learning process, since it is the only mechanism that makes it possible, at any time during an educational period, to detect the degree to which the proposed learning outcomes have been achieved and, if necessary, to apply the necessary corrections.

Assessment should be understood as a continuous and individualized process throughout the entire teaching-learning period, with priority given to evaluating the capacities, attitudes and skills of each student, as well as their performance.

The student evaluation process will include two types of performance:

- A system of continuous evaluation, which will be carried out throughout the entire learning period.
- A comprehensive evaluation test reflecting the achievement of learning outcomes, at the end of the learning period.

These assessment processes will be carried out through:

- Direct observation of the student in order to know his/her attitude towards the subject and the work it requires (attention in class, completion of assigned work, resolution of questions and problems, active participation in the classroom, etc.).
- Verification of their progress in the conceptual field (questions in class, comments in the classroom, completion of exams, etc.).
- Periodic oral and/or written tests to assess the degree of knowledge acquired, as well as the qualities of expression, oral and written, that this educational level requires.

System of continuous evaluation.

Following the spirit of Bologna, in terms of the degree of involvement and continuous work of the student throughout the course, the evaluation of the subject contemplates the system of continuous evaluation as the most appropriate to be in line with the guidelines set by the new framework of the EEES.

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

- Individual activities in class: The presentation and discussion of two works, in class and directed to their peers. This activity is valued from 0 to 10 points. (minimum score 5).
- Exercises, theoretical questions and proposed works: The teacher will propose exercises, problems, practical cases, theoretical questions, etc. to be solved individually.

This activity will be given in time and form and will be valued between 0 and 10 points.

- Written evaluation tests: These will consist of the typical written test scored from 0 to 10 points. The final mark for this activity will be given by the arithmetic average of these tests, provided that there is no unit mark below 3 points, in which case the activity will be failed.

As a summary of the above, the following table has been designed for the weighting process of the different activities in which the process of continuous evaluation of the course has been structured.

Evaluation activity	Weighting
Individual activities in class	10%
Individual practices	30%
Written assessment tests	60%

Prior to the first official call, the teacher will notify each student whether or not he or she has passed the course according to the continuous evaluation system, based on the sum of the scores obtained in the different activities carried out throughout the course.

In case of not passing in this way, the student will have two additional calls to do it (global test of evaluation), on the other hand the student who has passed the subject by means of the system of continuous evaluation, will also be able to choose the final evaluation, in first call, to raise marks but never to lower them.

To be eligible for the Continuous evaluation system, students must attend at least 80% of the classroom activities (practicum, practical training, etc.).

Comprehensive final evaluation test.

The student must opt for this modality when, due to his/her personal situation, he/she cannot adapt to the rhythm of work required in the continuous evaluation system, has failed or would like to raise his/her grade having participated in the evaluation methodology.

As in the system of continuous evaluation, the overall final assessment test must aim to check whether the learning results have been achieved, as well as to contribute to the acquisition of the various skills, and must be carried out through more objective activities if possible.

The comprehensive final assessment test will have the following group of qualifying activities:

- **Projects:** The student will delivery two projects (water supply and sanitation) at the beginning of the global evaluation test, as a sine qua non condition to pass the course. The student will answer in writing to the questions asked by the teacher. Valuing this activity from 0 to 10 points. A minimum of 5 points is required to pass the course.

- **Written exam:** It will consist of a test that will contain questions and problems related to the topics explained throughout the course.

This test will be valued from 0 to 10 points.

As a summary of the above, the following table has been designed to evaluate the different activities in which the final evaluation process of the course has been structured.

Evaluation activity	Weighting
Projects	30%
Written test	70%

The course will have been passed on the basis of the sum of the scores obtained in the different activities carried out.

For those students who have failed the continuous evaluation system, but some of their activities, with the exception of the written evaluation tests, have been carried out, they will be able to promote them to the global final evaluation test, in which case they will only have to take the written test.

All the activities covered by the overall final evaluation test, with the exception of the written examination, may be promoted to the next official convocation, within the same academic year.

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, 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 current course *Sistemas de Abastecimiento y Saneamiento en la Ingeniería de la Construcción* (Water supply and Sanitary systems in Civil Engineering) is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each topic, the problem-solving or resolution of questions and real-world projects, and at the same time supported by other activities.

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:** Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the course are displayed, highlighting the fundamentals, structuring them in topics and or sections, interrelating them.
- **Practice sessions:** The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.
- **Laboratory sessions.** Project Development Support Sessions: The lecture group is divided up into various groups, according to the number of registered students, but never with more than 20 students, in order to make up smaller sized groups. The students will develop real-world projects using the concepts learned in the theory and practice sessions
- **Tutorials:** Carried out giving individual, personalized attention with a teacher from the department. They can 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 practice sessions.
- Preparation of seminars, solutions to proposed problems, etc.
- Preparation of real-world projects.
- Preparation of the written tests for continuous assessment and final exams.

This course has 6 ECTS credits, which represents 150 hours of student work in the course during the term, 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 the course is moderate.

Activity	Weekly hours
Lectures	3
Supervised practice sessions	1
Other Activities	6

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

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

? 10 hours of Project Development Support Classes (supervised practice sessions), in 1 or 2-hour sessions.

? 6 hours of written assessment tests, one hour per test.

? 4 hours of PPT presentations.

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

There is a tutorial calendar timetable set by the teacher that can be requested by the students who want a tutorial.

4.3. Syllabus

This course will address the following topics:

- Topic 1. Water supply. General concepts.
- Topic 2. Urban water consumption.
- Topic 3. Calculate water supply networks.
- Topic 4. Materials and equipment in water supply networks.
- Topic 5. Water supply projects.
- Topic 6. Construction of water supply projects.
- Topic 7. Operation & Maintenance of water supply systems.
- Topic 8. Sanitary. General concepts.
- Topic 9. Urban hydrology.
- Topic 10. Hydraulics of drainage networks.
- Topic 11. Materials and equipment in drainage/sanitary networks.
- Topic 12: Facilities of drainage/sanitary networks.
- Topic 13. Drainage/sanitary projects.
- Topic 14. Construction of drainage/sanitary projects.
- Topic 15. Operation & Maintenance of drainage systems.

4.4. Course planning and calendar

The list below shows the contents of each week. They are consistent with the topics of the course (The order could be modified in case of changes in the university calendar)

- Week 1: Topic 1. Road network characteristics.

- Week 2: Topic 1. Road network characteristics.

- Week 3: Topic 2. Geometrical road design.

- Week 4: Topic 2. Geometrical road design.

- Week 5: Topic 2. Geometrical road design.

- Week 6: Topic 3. Infrastructure. Surface drainage

- Week 7: Topic 3. Infrastructure. Surface drainage

- Week 8: Topic 3. Infrastructure. Subsurface drainage
- Week 9: Topic 3. Infrastructure. Geology and geotechnics
- Week 10: Topic 3. Infrastructure. Geology and geotechnics
- Week 11: Topic 3. Infrastructure. Construction of embankment
- Week 12: Topic 3. Infrastructure. Construction of embankment
- Week 13: Topic 4. Road surface and pavements.
- Week 14: Topic 4. Road surface and pavements.
- Week 15: Topic 5. Road safety.

Further information concerning the timetable, classroom, office hours, assessment dates (<http://eupla.unizar.es/asuntos-academicos/examenes>) 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=28729>