

Course guide 2500051 - GECAIGPROV - Water Supply

Barcelona School of Civil 751 - DECA - Departmer	l Engineering nt of Civil and Environmental Engineering.	Last modified: 01/10/2023
BACHELOR'S DEGREE IN	N CIVIL ENGINEERING (Syllabus 2020). (Optional subject	t).
ECTS Credits: 4.5	Languages: Catalan	
	Barcelona School of Civi 751 - DECA - Departme BACHELOR'S DEGREE IN ECTS Credits: 4.5	Barcelona School of Civil Engineering 751 - DECA - Department of Civil and Environmental Engineering. BACHELOR'S DEGREE IN CIVIL ENGINEERING (Syllabus 2020). (Optional subject ECTS Credits: 4.5 Languages: Catalan

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Others:	IVET FERRER MARTI, JOAN GARCIA SERRANO, MARIA SOLÉ BUNDÓ

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

14417. Knowledge and understanding of the supply and sanitation systems, as well as their sizing, construction and conservation. (Specific technology module: Civil Construction)

14419. Knowledge and understanding of the functioning of ecosystems and environmental factors. (Specific technology module: Hydrology)

14420. Knowledge of urban services projects related to water distribution and sanitation. (Specific technology module: Hydrology) 14421. Knowledge and understanding of the supply and sanitation systems, as well as their sizing, construction and conservation. (Specific technology module: Hydrology)

Generical:

14380. Scientific-technical training for the exercise of the profession of Technical Engineer of Public Works and knowledge of the functions of advice, analysis, design, calculation, project, construction, maintenance, conservation and exploitation.

14383. Ability to project, inspect and direct works, in their field.

14384. Capacity for the maintenance and conservation of hydraulic and energy resources, in its field.

14386. Capacity for maintenance, conservation and exploitation of infrastructure, in its field.

14389. Knowledge of the history of civil engineering and training to analyze and assess public works in particular and construction in general.

14390. Identify, formulate and solve engineering problems. Pose and solve construction engineering problems with initiative, decision-making skills and creativity. Develop a systematic and creative method of analysis and problem solving. (Additional school competition).

TEACHING METHODOLOGY

The course consists of 3 hours per week of classroom activity, which are devoted to: 1) theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises, and 2) solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.



LEARNING OBJECTIVES OF THE SUBJECT

To know scientific and technical principles of water supply. Knowledge on demand for water consumption. Supply sources. Purification treatment. Disinfection before injection in the network. Supply networks: Pipe networks, pressure management in a network. Alternative sources: Desalination.

1 Ability to understand the different processes that occur during water purification: coagulation, flocculation, sedimentation, filtration, adsorption, disinfection, softening or desalination.

2 Capacity for sizing a drinking water treatment station.

Establishment of the scientific fundamentals and technical principles of water supply, from catchment to distribution. It focuses especially on treatment processes aimed at improving water quality. Legislative framework. Water quality. Management of a supply system. Deposits and distribution networks. Water supply flows. Catchment and pre-treatment. Coagulation and flocculation. Sedimentation. Filtration. Desalination. Adsorption. Disinfection. Softening. Treatment of sludge.

STUDY LOAD

Туре	Hours	Percentage
Hours large group	22,5	20.00
Hours medium group	22,5	20.00
Self study	63,0	56.00
Guided activities	4,5	4.00

Total learning time: 112.5 h

CONTENTS

1. Legislative framework. Supply water quality

Description:

Decree 3/2003 TR waters in Catalonia. Technical-sanitary standard (RD 140/2003). Quality parameters. Water Framework Directive (2000/60 / EC). Management Plan and Program of Measures (Catalonia). The urban water cycle. General description of the stages of water treatment in an ETAP.

Full-or-part-time: 12h

Theory classes: 5h Self study : 7h

2. Management of a supply system. Deposits and distribution networks

Description:

Service provision management, service costs and pricing. Concepts on the water bill. Tanks and distribution networks: type, design, calculation and construction criteria. Types of pipes.

Full-or-part-time: 14h 23m Theory classes: 6h Self study : 8h 23m



3. Supply water flows

Description:

Uses of water. Water balance. Calculation of supply flows and demand estimation.

Full-or-part-time: 12h

Theory classes: 5h Self study : 7h

4. Capture and pretreatment

Description:

Surface and groundwater abstraction. Roughing, sanding, pre-decanting and degreasing, sieving and pre-chlorination.

Full-or-part-time: 7h 11m Theory classes: 3h Self study : 4h 11m

5. Coagulation and flocculation

Description:

Basic principles, reagents and reactors used. Addition of polyelectrolytes. Flocculation test (jar test), coagulant dose. by sweeping. System sizing.

Full-or-part-time: 9h 36m

Theory classes: 4h Self study : 5h 36m

6. Sedimentation

Description:

Basic principles, types of decanters, cleaning and extraction of the sludge generated. Surface hydraulic load. Design of decanters

Full-or-part-time: 7h 11m Theory classes: 3h Self study : 4h 11m

7. Filtration

Description: Granular medium filters. Slow filters and fast filters. Surface hydraulic load. Multilayer filters. Load losses. Design.

Full-or-part-time: 9h 36m Theory classes: 4h Self study : 5h 36m



8. Desalination

Description:

Membrane filtration. Fundamentals of reverse osmosis. Desalination plants.

Full-or-part-time: 7h 11m Theory classes: 3h Self study : 4h 11m

9. Adsorption

Description:

Basic principles. Technical characteristics and operation of the filters. Design of activated carbon filters.

Full-or-part-time: 7h 11m Theory classes: 3h Self study : 4h 11m

10. Disinfection

Description:

Disinfection methods. Chlorination. Chlorine and its derivatives. Active chlorine. Free and combined chlorine. Disinfection with ultraviolet light. Disinfection with ultraviolet light cone. Ozone disinfection.

Full-or-part-time: 7h 11m Theory classes: 3h Self study : 4h 11m

11. Softening

Description: Concept of water hardness. Softening methods.

Full-or-part-time: 7h 11m Theory classes: 3h Self study : 4h 11m

12. Sludge treatment

Description: Basic principles and technical means. Origin and composition of sludge. Thickening and dehydration.

Full-or-part-time: 7h 11m Theory classes: 3h Self study : 4h 11m



GRADING SYSTEM

The mark of the course is obtained from the ratings of continuous assessment.

Continuous assessment consist in several activities, both individually and in group, of additive and training characteristics, carried out during the year (both in and out of the classroom).

The teachings of the laboratory grade is the average in such activities.

The evaluation tests consist of a part with questions about concepts associated with the learning objectives of the course with regard to knowledge or understanding, and a part with a set of application exercises.

Criteria for re-evaluation qualification and eligibility: students that failed the ordinary evaluation and have regularly attended all evaluation tests will have the opportunity of carrying out a re-evaluation test during the period specified in the academic calendar. Students who have already passed the test or were qualified as non-attending will not be admitted to the re-evaluation test. The maximum mark for the re-evaluation exam will be five over ten (5.0). The non-attendance of a student to the re-evaluation test, in the date specified will not grant access to further re-evaluation tests. Students unable to attend any of the continuous assessment tests due to certifiable force majeure will be ensured extraordinary evaluation periods.

These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the course, and will be carried out within the corresponding academic period.

BIBLIOGRAPHY

Basic:

- Hernández Muñoz, A. Abastecimiento y distribución de agua. 6a ed. rev. y ampl. Madrid: Garceta, 2015. ISBN 9788416228331.