

Course guide

2500041 - GECENGSAI - Sanitary Engineering

Last modified: 01/10/2023

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.

Degree: BACHELOR'S DEGREE IN CIVIL ENGINEERING (Syllabus 2020). (Optional subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** Catalan

LECTURER

Coordinating lecturer: IVET FERRER MARTI, JOAN GARCIA SERRANO

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

Knowledge of autonomous treatment. Sanitary Engineering. Sewer design. Secondary treatment. Oxygen consumption. Biological nitrogen removal. Phosphorus removal. Treatment wetlands design.

1 Capacity for the project and design of sewer treatment systems.

Development at a specialization level of the basic concepts acquired from environmental engineering in the preceding subject on water technologies. Introduction. Legislative framework. Characterization of residual water. Design Bases. Sewage networks. Autonomous sewage systems. General outline of a WWTP. Pretreatment. Primary treatment. Secondary treatment. Treatment of sludge. Project of a WWTP. Tertiary treatment. Lagoons and Wetlands.

STUDY LOAD

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

Total learning time: 112.5 h

CONTENTS

1. INTRODUCTION

Description:

Approach subject, objectives, summary agenda

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m

2. WASTEWATER CHARACTERIZATION

Description:

Waste water parameters,

Full-or-part-time: 12h

Theory classes: 5h

Self study : 7h

3. DESIGN BASICS

Description:

High network and low network, unit and separative networks, design criteria, constructive criteria, hydraulic calculation, design of pumping stations

Full-or-part-time: 12h

Theory classes: 5h

Self study : 7h

4. SANITATION NETWORKS

Description:

Xarxa en alta i xarxa in baixa, xarxes unitàries i separatives, criteris de disseny, criteris constructius, càlcul hydraulic, disseny d'estacions de bombament

Full-or-part-time: 14h 23m

Theory classes: 6h

Self study : 8h 23m

5. AUTONOMOUS SANITATION SYSTEMS

Description:

Small systems, septic tanks and Imhoff tanks, infiltration ditches

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m

6. GENERAL SCHEME OF A WATER

Description:

Water line and sludge line, design flows, unit processes, general scheme.

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m

7. PRE-TREATMENT

Description:

Coarse well and roughing grate, sieved,

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m

8. PRIMARY TREATMENT

Description:

Primary decantation, physical-chemical treatment.

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m

9. SECONDARY TREATMENT

Description:

Types of microorganisms, cellular metabolism, microbial kinetics, activated sludge, biological reactors, design and construction criteria. Nitrogen and phosphorus removal, calculation of oxygen needs, practical design of an activated sludge process, systems on fixed substrate, secondary decantation

Full-or-part-time: 14h 23m

Theory classes: 6h

Self study : 8h 23m

10. SLUDGE TREATMENT

Description:

Primary sludge and secondary sludge. Sludge treatment: thickening, dehydration, drying. All systems.

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m

11. PROJECT OF A WAREHOUSE

Description:

Piezometric line calculation, treatment type choice, project documents.

Full-or-part-time: 2h 24m

Theory classes: 1h

Self study : 1h 24m

12. TERTIARY TREATMENT

Description:

Reference regulations, processes and disinfection, water uses.

Full-or-part-time: 2h 24m

Theory classes: 1h

Self study : 1h 24m



13. ALL TREATMENTS

Description:

Lagoons and wetlands. Design principles.

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:

- Metcalf and Eddy. Ingeniería de aguas residuales: tratamiento, vertido y reutilización. 3a ed. Madrid: McGraw Hill, 1995. ISBN 8448116070.