Sanitary Engineering (2500041)

General Information

School	ETSECCPB
Departments	Departament d'Enginyeria Civil i Ambiental (DECA)
Credits	4.5 ECTS
Programs	GRAU EN ENGINYERIA CIVIL (pla 2020) PARS: ENGINYER/A DE CAMINS, CANALS I PORTS (pla 2022)
Course	2025/26

Main teaching language at each group

- Group 10Q1 Catalan (Q1)

Faculty

Responsible Faculty: Fabiana Passos Lopes
Faculty: Fabiana Passos Lopes

Objectives of Education

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 sewater 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.

Competencies

Especific

Knowledge and understanding of the supply and sanitation systems, as well as their sizing, construction and conservation. (Specific technology module: Civil Construction)
Knowledge and understanding of the functioning of ecosystems and environmental factors. (Specific technology module: Hydrology)
Knowledge of urban services projects related to water distribution and sanitation. (Specific technology module: Hydrology)
Knowledge and understanding of the supply and sanitation systems, as well as their sizing, construction and conservation. (Specific technology module: Hydrology)

Generic

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.
Ability to project, inspect and direct works, in their field.
Capacity for the maintenance and conservation of hydraulic and energy resources, in its field.
Capacity for maintenance, conservation and exploitation of infrastructure, in its field.

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

Total hours of student work

		Hours	Percentage
Supervised Learning	Large group	45.0 h	100.00 %
	Medium group	0.0 h	0.00 %
	Laboratory classes	0.0 h	0.00 %
	Guided Activities	0.0 h	0.00 %
Self Study		67.5 h	

Contents

1. INTRODUCTION

Approach subject, objectives, summary agenda

2. WASTEWATER CHARACTERIZATION

Waste water parameters,

3. DESIGN BASICS

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

4. SANITATION NETWORKS

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

5. AUTONOMOUS SANITATION SYSTEMS

Small systems, septic tanks and Imhoff tanks, infiltration ditches

6. GENERAL SCHEME OF A WATER

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

7. PRE-TREATMENT

Coarse well and roughing grate, sieved,

8. PRIMARY TREATMENT

Primary decantation, physical-chemical treatment.

9. SECONDARY TREATMENT

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

10. SLUDGE TREATMENT

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

11. PROJECT OF A WAREHOUSE

Piezometric line calculation, treatment type choice, project documents.

12. TERTIARY TREATMENT

Reference regulations, processes and disinfection, water uses.

13. ALL TREATMENTS

Lagoons and wetlands. Design principles.

Activities

Teaching trips

Field trip to a WWTP to complement the theoretical knowledge

Dedication

4h 30m

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.

Grading Rules

(*) The evaluation calendar and grading rules will be approved before the start of the course.

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. The percentage of the subject grade will be calculated as follows:
15% Partial exam
35% Activities carried out during classes
50% Final exam

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.

Office Hours

Send an e-mail to the professor

Bibliography

Basic

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