Course guide
2500041 - GECENSANI - Sanitary Engineering

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: 2022  ECTS Credits: 4.5  Languages: Catalan

LECTURER

Coordinating lecturer: IVET FERRER MARTI
Others: IVET FERRER MARTI, 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)

General:
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.

TEACHING METHODOLOGY

The course consists of 1.5 hours per week of classroom activity (large size group) and 1.5 hours weekly with half the students (medium size group).

The 1.5 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 1.5 hours in the medium size groups is devoted to 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.
LEARNING OBJECTIVES OF THE SUBJECT


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


STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>22,5</td>
<td>20.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>4,5</td>
<td>4.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>22,5</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>63,0</td>
<td>56.00</td>
</tr>
</tbody>
</table>

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 and their corresponding laboratories and/or classroom computers.

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.

BIBLIOGRAPHY

Basic: