Course guide

320073 - GTR - Waste Management and Treatment

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.

Degree: BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Optional subject).

Academic year: 2023  ECTS Credits: 6.0  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: Mª Dolores Alvarez del Castillo

Others:

TEACHING METHODOLOGY

The course is divided into four types of sessions:
- Theoretical sessions and application of content. In these sessions, the professor will explain the theoretical basis of the material, concepts, and methods and illustrate them with appropriate examples to facilitate understanding.
- Lab sessions.
- Individual work. Students will spend time outside the classroom to understand the theoretical content.
- Work in pairs. Students will spend time outside the classroom to working in pairs to prepare the working laboratory sessions as directed by the teacher.

LEARNING OBJECTIVES OF THE SUBJECT

The objectives of the course are to enable students to:
- Identify the different types of waste and the hierarchy of waste management.
- Identify and apply properly the key technologies for the treatment and recovery of waste.
- Identify the various stakeholders in the regulatory and legal aspects related to waste management.
- Correctly managing various waste that can be generated as a result of the production activity of company, using the current regulations.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>45,0</td>
<td>30.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h
## CONTENTS

### Topic 1. Introduction to waste

**Description:**
- Definition of waste
- Types of waste
- Generation of waste by type
- Administrative competences in the field of waste management.
- The waste hierarchy management.

**Full-or-part-time:** 2h 30m  
Theory classes: 1h  
Self study : 1h 30m

### Topic 2. Municipal waste. Generation, collection of structure

**Description:**  
- Generation and composition of municipal waste  
- Management of municipal waste. Collection and transportation operations, planning microroutes, economy collection, transfer plants.

**Full-or-part-time:** 7h 30m  
Theory classes: 3h  
Self study : 4h 30m

### Topic 3. MUNICIPAL WASTE. Biological treatment

**Description:**  
- TMB Plants. Equipment and performance of separation treatments associated with different material flows. Composting plants. Biological basis of the process. Parameters to control. Inputs, transactions carried out in the plant and outputs. Performances  
- Methanization plants  
Biological basis of the process. Parameters to control. Composition of biogas. Inputs, transactions carried out in the plant and outputs. Performances

**Related activities:**  
- OFMSW Anaerobic digestion. Obtaining methane.

**Full-or-part-time:** 30h  
Theory classes: 9h  
Laboratory classes: 3h  
Self study : 18h
### Topic 4. Waste disposal

**Description:**
- Type of landfills (Class I, II, and III).
- Waterproofing, Exploitation Control, sealed. Elements of restoration.
- Reactions that take place in a landfill. Evolution processes in a landfill.
- Composition and treatment of leachate.
- Study of various leachate treatment technologies

**Related activities:**

**Full-or-part-time:** 25h
- Theory classes: 6h
- Laboratory classes: 4h
- Self study: 15h

### Topic 5. Heat treatment systems for waste

**Description:**
- The municipal waste as fuel. PCI, Humidity...
- CDR. Preparation of the residue for direct use, pyrolysis and gasification.

**Full-or-part-time:** 25h
- Theory classes: 10h
- Self study: 15h

### Topic 6. Industrial Waste. Generation, structure and types

**Description:**
- Composition and industrial waste generation.
- Type of industrial waste (ES, NE). Characterization of the waste classification. Dam Festival. Leaching tests, analysis on the leaching residue

**Full-or-part-time:** 20h
- Theory classes: 4h
- Laboratory classes: 4h
- Self study: 12h
**Topic 7. Industrial waste management.**

**Description:**
- Responsibilities. Control Documentation for the traceability and waste DAR, FA, FS., JRR, FD, FSAA.
- Exchange of products.
- Regeneration of mineral oils
- Stabilization of a residue

**Related activities:**
Obtaining biodiesel from used vegetable oil.

**Full-or-part-time:** 40h

- Theory classes: 12h
- Laboratory classes: 4h
- Self study: 24h

**GRADING SYSTEM**
- 1st Exam: 35%
- 2nd Exam: 35%
- Delivering activities: 10%
- Lab: 20%

**EXAMINATION RULES.**
Attendance at laboratory sessions is mandatory.
The unsatisfactory results of the First exam will redirected through a written test that will be held in the same day as the second exam. All the students enrolled in the course can access to this second-chance.
The second-chance exam results will have a score between 0 and 10, and the score obtained will replace the initial score of the exam 1, as long as the score is higher.

**BIBLIOGRAPHY**

**Basic:**