

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	435 - Bachelor's Degree in Chemical Engineering
ECTS	6.0
Year	4
Semester	Second semester
Subject Type	Optional
Module	---

1.General information**1.1.Introduction****1.2.Recommendations to take this course****1.3.Context and importance of this course in the degree****1.4.Activities and key dates****2.Learning goals****2.1.Learning goals****2.2.Importance of learning goals****3.Aims of the course and competences****3.1.Aims of the course****3.2.Competences****4.Assessment (1st and 2nd call)****4.1.Assessment tasks (description of tasks, marking system and assessment criteria)****5.Methodology, learning tasks, syllabus and resources****5.1.Methodological overview**

This subject includes theory and practice and its learning process is based on 2.4 ECTS of work done in-person (60 hours), and 3.6 ECTS (90 hours) of self-guided study and work group. The programmed activities are detailed below.

The class presentations, work group and laboratory instructions are available for the students at the subject website (Moodle platform) that can be found at <http://moodle2.unizar.es/add/> .

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5.2.Learning tasks

On-site activities: 2.4 ECTS, 60 hours

1. Classroom based sessions (TP1): 30 hours, 2 per week. Sessions with theoretical and practical contents. The units are presented encouraging class participation, reflexive and proactive attitudes.
2. Problem solving and case studies (TP2): 15 hours, 1 per week. Exercises and case studies will be done in order to complement theoretical sessions. The student should work on the preparation of these case studies previously, and participate in class.
3. Laboratory and simulation sessions (TP3): 10 hours divided in 5 sessions of 2 hours each. The student will develop practical skills related to waste management, either based on simulation software or in laboratory work. The student should read the instructions for each sessions previously and be able to hand in the required report at the end of each session.
4. Evaluation (TP8): 5 hours. Besides obtaining a mark, evaluation is one of steps of the learning process, where the students can check their degree of understanding of the presented concepts and their acquirement of the required competencies.

If possible, some visits to waste management facilities will be planned during the semester. These visits are voluntary for the students. Attendance will account for approximately 5 hours of non on-site activities.

Non on-site activities: 3.6 ECTS, 90 horas.

1. Study (TP7): 80 hours. Includes study and problem solving. Continuous work by the student will be encouraged. Tutorials are also included in this section.
2. Work group (TP7): 10 hours. Includes the development of a subject related to waste management in groups of 2-3 persons.

5.3.Syllabus

Module 1. Waste management

Unit 1.1. Introduction, General concepts

Unit 1.2. Integral waste management. Management of hazardous wastes

Unit 1.3.Waste minimization

Unit 1.4. Recovery materials facilities

Unit 1.5. Advanced technologies for recycling

Unit 1.6. Advanced biological treatments for wastes

Unit 1.7. Advanced thermal treatments for wastes

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Unit 1.8. Advanced concepts of landfilling

Unit 1.9. Management of urban WWTP sludges

Module 2. Environmental impact assessment (EIA)

Unit 2.1. Introduction to Environmental Impact Assessment.

Unit 2.2. Impact Assessment. Concept and features.

Unit 2.3. Administrative procedure of environmental impact assessment

Unit 2.4. The environmental impact study.

Laboratory sessions:

Lab session nº 1. Design and control of a composting process of urban wastes (I)

Lab session nº 2. Management of industrial wastes (I)

Lab session nº 3. Management of industrial wastes (II)

Lab session nº 4. Thermal treatments of wastes

Lab session nº 5. Design and control of a composting process of urban wastes (II)

5.4.Course planning and calendar

Planning (summary):

- Classroom based sessions (TP1). 30 hours total (2 per week)
- Problem solving and case studies (TP2). 15 hours total (1 per week)
- Laboratory and computer sessions (TP3). 10 hours total (5 sessions, 2 hours each)
- Evaluation (TP8): 5 hours total.
- Home study (TP7): 80 hours estimated.
- Work group (TP7): 10 hours estimated.

5.5. Bibliography and recommended resources

- BB** Elias Castells, Xavier. Reciclaje de residuos industriales : aplicación a la fabricación de materiales para la construcción / Xavier Elias Castells Madrid : Díaz de Santos, D.L. 2000
- BB** Tchobanoglous, George. Gestión integral de residuos sólidos / George Tchobanoglous, Hilary Theisen, Samuel Vigil ; traducción y revisión técnica Juan Ignacio Tejero Monzón, José Luis Gil Díaz, Marcel Szanto Narea . - [1a. ed. en español] Madrid [etc.] : McGraw-Hill, D.L.1994
- BB** Evaluación de impacto ambiental / Alfonso Garmendia Salvador...[et al.] Madrid [etc.] : Pearson/Prentice Hall, cop. 2005.
- BB** Conesa Fernández-Vítora, Vicente. Guía metodológica para la evaluación del impacto ambiental / Vicente Conesa Fdez.-Vítora ; colaboradores, Vicente Conesa Ripoll, Luis A. Conesa Ripoll ; prólogos de María Teresa Estevan Bolea . - 4ª ed. Madrid: Mundi-Prensa, 2010