

25226 - Management, treatment and recovery of waste

Syllabus Information

Academic Year: 2020/21

Subject: 25226 - Management, treatment and recovery of waste

Faculty / School: 201 - Escuela Politécnica Superior

Degree: 277 - Degree in Environmental Sciences
571 - Degree in Environmental Sciences

ECTS: 6.0

Year: 3

Semester: Second Four-month period

Subject Type: Compulsory

Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as theory and problem sessions, group work, seminars, laboratory sessions and fieldwork.

The teaching methodology used in the course will be based on the model of lecture to address the basic theoretical concepts of the subject, trying to encourage student participation through short questions. On the other hand, various problems and practical cases will be solved in the classroom and in the computer which will allow students to relate the theoretical concepts and see their application. These case studies are complemented by visits to treatment facilities and waste disposal.

4.2.Learning tasks

This course is organized as follows:

- **Theory and problem sessions** (30 hours). 2 weekly hours where the teacher develops the contents of the course. Part of the lectures are devoted to solving problems posed by the teacher with the direct participation of students.
- **Group work** (16 hours). Elaboration and oral presentation of a group assignment (3 to 4 students) that covers most of the contents of the course and which is elected by the student at the beginning of the course. Their progress is monitored by the teacher. Oral presentation of the assignment.

- **Seminars** (12 hours). 5 sessions focused on solving problems and case studies by students with teacher's guidance.
- **Laboratory sessions** (8 hours). 4 sessions guided by the teacher and focused on experiments related to the topics of the course.
- **Visits** (10 hours) to facilities management and waste treatment.
- **Exams** (4 hours).
- **Autonomous work and study**. Studying of cases, projects, plans or management programs real waste, both the scope of the various authorities involved in its management, and the business environment, further supplemented by visits to various facilities waste treatment.
- **Individual tutoring** by virtual platform moodle2.unizar.es and by video conference via Google Meet, will be conducted to clarify the particular problems of each student and mandatory tutoring to work with reduced groups specific topics.

4.3.Syllabus

This course will address the following topics:

Lectures

Section 1. Domestic and commercial waste

- Topic 1. General concepts about waste. Introduction to the management of returns. Domestic and commercial waste. Basic legislation on waste. Waste hierarchy. Administrative competences.
- Topic 2. Waste management plans. State waste prevention program 2014-2020. State waste management framework plan (PEMAR) 2016-2022. Comprehensive waste management plan for Aragón (GIRA) 2016-2022.
- Topic 3. Characteristics of domestic and commercial waste. Composition. Physical, chemical and biological properties.
- Topic 4. Packaging waste management. Packaging law.
- Topic 5. Management of household and commercial waste. Generation rates. Activities in origin. Collection and transport. Separation, processing and thermal and biological transformation. Transfer and transport. Landfill disposal.

Section 2. Industrial waste

- Topic 1. Waste management in the company. Industrial waste: identification and characterization.
- Topic 2. Management of non-hazardous industrial waste. Normative.
- Topic 3. Management of hazardous waste. Normative. Physical-chemical treatments. Discharge and incineration.
- Topic 4. Treatment of Residual Organic Matter. Composting and biomethanization.

Practice sessions

Seminars

- S1. Waste characterization.
- S2. Design of a waste collection plan: Part I.
- S3. Design of a waste collection plan: Part II.
- S4. Waste incineration.
- S5. Estimation of gas production in a landfill.

Laboratory

- L1. Design and control of a process of aerobic composting of municipal solid waste. Part I: preparation of compost.
- L2. Stabilization and solidification of hazardous waste: part I.
- L3. Stabilization and solidification of hazardous waste: part II.
- L4. Design and control of a process of aerobic composting of municipal solid waste: Part II: Analysis of compost.

4.4.Course planning and calendar

It is estimated that an average student must devote a total of 150 hours to this course, which should encompass both face-to-face activities and non face-to-face ones, according to the following calendar:

Activity/Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
---------------	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----

Class activity

Lectures	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Seminars				2	2	2			2			2		2			
Lab sessions		2								2	2			2			
Visits							5						5				
Evaluation																	
<i>Autonomous work and study</i>																	
Individual work	4	2	4	2	3	2	1	4	8	2	3	3	1	2	3	6	8
Collective work		2	2	2	1	2		2		2	1	1		2	1		
TOTAL	6	8	8	8	8	8	8	8	8	8	8	8	10	8	8	8	8

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Sciences/Polytechnic School of Huesca website and Moodle.

4.5. Bibliography and recommended resources

- BB** Contaminación ambiental : una visión desde la química / Carmen Orozco Barrenetxea ... [et al.] . Madrid [etc.] : Thomson, D. L. 2002
- BB** GIRA : plan de gestión integral de residuos de Aragón : [2009-2015]. [Zaragoza] : Observatorio de Medio Ambiente de Aragón : Dirección General de Calidad Ambiental y Cambio Climático, Gobierno de Aragón, D.L. 2009
- BB** Los residuos peligrosos : caracterización, tratamiento y gestión / editores, J.J. Rodríguez Jiménez y A. Irabien Gulías ; J. Aguado Alonso ... [et al.] . Madrid : Síntesis, D.L 1999
- BB** Tchobanoglous, George. Gestión integral de residuos solidos / George Tchobanoglous, Hilary Theisen, Samuel Vigil ; traducción y revisión técnica Juan Ignacio Tejero Monzón, José Luis Gil Diaz, Marcel Szanto Narea . [1a. ed. en español, reimpr.] Madrid [etc.] : McGraw-Hill, D.L.1996
- BC** Elías Castells, X. Métodos de valorización y tratamiento de residuos municipales. Madrid: Díaz de Santos, 2012 [Comentario del profesor: libro electrónico]
- BC** López Pérez, María Dolores. Recogida y transporte de residuos urbanos o municipales. UF0284. Madrid : Editorial CEP, 2017 [Comentario del profesor: libro electrónico]
- BC** López Pérez, María Dolores. Tratamiento de residuos urbanos o municipales. UF0285. Madrid : Editorial CEP, 2017 [Comentario del profesor: libro electrónico]
- BC** Navas Cuenca, Estefanía. Gestión de residuos peligrosos. Málaga: Editorial ICB, 2015[Comentario del profesor: libro electrónico]
- BC** Pecoraio, Simona. MF0076_2: Gestión de residuos urbanos. [s.l.]: Cano Pina, 2015 [Comentario del profesor: libro electrónico]
- BC** Pecoraio, Simona. MF0077_2: Gestión de residuos industriales. [s.l.]: Cano Pina, 2015 [Comentario del profesor: libro electrónico]
- BC** Sathwani Alonso, J.J. Gestión y tratamiento de residuos I. Las Palmas de Gran Canaria : Universidad, Servicio de Publicaciones y Difusión Científica, 2015 [Comentario del profesor: libro electrónico]
- BC** Sánchez Ferrer, Antoni, et al. De residuo a recurso. El camino hacia la sostenibilidad. I. Recursos orgánicos. 4. Residuos urbanos. Madrid: Mundi-Prensa, 2014 [Comentario del profesor: libro electrónico]

LISTADO DE URLs:

Ley 22/2011, de 28 de julio, de residuos y suelos contaminados
[http://noticias.juridicas.com/base_datos/Admin/l22-2011.html]

The updated recommended bibliography can be consulted in: <http://psfunizar10.unizar.es/br13/egAsignaturas.php?id=10984>