COURSE DATA

DATA SUBJECT

Code: 43809
Name: Waste management and treatment
Cycle: Master's Degree
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
2250 - Master's Degree in Environmental Engineering	Escola Tècnica Superior d'Enginyeria	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2250 - Master's Degree in Environmental Engineering	Gestión y tratamiento de residuos	COMPULSORY

COORDINATION

BOUZAS BLANCO ALBERTO

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SUMMARY

In the present subject it is intended that students know all management operations, from generation to final destination, both urban solid waste and hazardous waste, as well as propose, for a given type of waste, which it is the most appropriate management scheme according to the existing conditions. For this it is necessary to achieve the following specific objectives:

Know the operations of collection and transport of waste.

Study the different waste treatment operations: recovery of the organic fraction (composting and biomethanisation), recovery of the combustible fraction (incineration with energy recovery), physical and chemical treatment of hazardous waste and disposal operations.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

Relationship with other subjects of the same degree:
There are no specified enrollment restrictions with other subjects of the currículum.

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There are no specified enrollment restrictions with other subjects of the currículum.

COMPETENCES / LEARNING OUTCOMES

2250 - Master's Degree in Environmental Engineering

Apply environmental engineering designs to produce solutions that meet specific needs addressing public health, safety and welfare taking account of global, cultural, social, environmental and economic factors.

Design, calculate and select engineering solutions to environmental problems, comparing alternatives that include emerging technologies under criteria of technical, social, economic and environmental viability.

Develop environmental solutions under the principles of circular economy and the sustainable development goals.

Identify, formulate and solve complex environmental engineering problems by applying engineering, scientific and mathematical principles.

Implement measures for preventing pollution and recovering, protecting and improving environmental quality.

Interpret and apply national and international environmental legislation and adapt environmental solutions to these regulations.

Learn and apply new knowledge, using appropriate learning strategies.

Manage and operate treatment and/or purification systems in the field of environmental engineering

Prepare and draft technical reports and/or environmental engineering projects considering technical, economic, social, energy and/or environmental aspects.

Recognise the ethical and professional responsibilities of environmental engineering and make informed judgements considering the impact of engineering solutions in global, economic, environmental and social contexts.

Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.

Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.

Students should communicate conclusions and underlying knowledge clearly and unambiguously to both

specialized and non-specialized audiences.

Students should demonstrate self-directed learning skills for continued academic growth.

Students should possess and understand foundational knowledge that enables original thinking and research in the field.

Work in a team effectively and with leadership, in a collaborative and inclusive environment, setting goals, planning tasks and meeting objectives.

DESCRIPTION OF CONTENTS

1.

Introduction: Waste concept. Origins and type of wastes. Classification.
Hazardous and non-hazardous waste. Production and composition of waste. Legal Framework: Legislation of the Autonomous, State and European Community.

2.

Physical, chemical and biological properties of solid waste. Introduction to the study of physical, chemical and biological transformations of urban solid waste. Comparative study of treatment methods.

3.

Waste management. Priorities in waste management. National and regional plans.

4.

Collection, transfer and transport of solid waste. Transfer and treatment centers.

5.

Basic operations for the separation and processing of residual materials. Waste sorting plants for the recovery of waste materials.

6.

Recovery of the organic fraction of non-hazardous waste (I):
Composting. Microbiology of the process. Factors that intervene in the process. Phases of fermentation. Compost manufacturing process: Reception and classification, composting methods, fermentation and storage areas. Composting of vegetable waste.

7.

Recovery of the organic fraction of non-hazardous waste (II):
Biomethanization. Microbiology of the process. Factors that intervene in the process. Phases of digestion. Biomethanization process: conditioning of waste, digestion, collection and use of biogas and treatment of the solid fraction.

8.

Valorisation of the combustible fraction: Incineration: combustion of waste, cooling of combustion fumes, control of air pollution, solid waste produced, thermal balance of an incinerator, combustion furnaces, treatment facilities for the resulting products, facilities of heat recovery. Gasification. Pyrolysis

9.

Landfills. Selection of the location. Basic studies necessary for the writing of a project. Elements of a project. Classification of non-hazardous waste landfills. Teams and staff Methods of exploitation of non-hazardous waste landfills. Specific problems in the operation of a landfill. Recovery and subsequent use of landfills. Landfills for hazardous waste. Security deposits.

10.

The hazardous waste. Most common treatments of hazardous waste. Physical and chemical treatments. Advanced treatments. Inerting techniques. Solidification and stabilization. Thermal destruction Industrial use of waste streams.

11.

Management of special waste streams: hospital waste, end-of-life vehicles, used tires, used oils, etc.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	5,00
Theory	25,00
Theoretical and practical classes	3,00
Seminar	2,00
Other activities	5,00
Group work	4,00
Classroom practices	16,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	20,00
Independent study and work	30,00
Preparation of lessons	20,00
Preparation for assessment activities	0,00
Resolution of case studies	20,00
Total hours	**90,00**

TEACHING METHODOLOGY

The training activities will be developed according to the following distribution:

• Theoretical activities.

In the theoretical classes the topics will be developed providing a global and integrating vision, analyzing in greater detail the key aspects and of greater complexity, promoting, at all times, the participation of the student.

• Practical activities.

They complement the theoretical activities with the aim of applying the basic concepts and expanding them with the knowledge and experience that they acquire during the realization of the proposed works. They include the following types of face-to-face activities:

- Classes of problems and questions in the classroom.

- Discussion and problem solving sessions and exercises previously worked on by the students.

- Oral presentations.

- Visits to industrial facilities.

- Scheduled tutoring (individualized or in groups).

• Student's personal work.

Realization (outside the classroom) of monographic works, directed bibliographic search, issues and problems, as well as the preparation of classes and exams (study). This task will be carried out individually and tries to promote autonomous work.

• Work in small groups.

Realization, by small groups of students (2-4) of work, issues, problems outside the classroom. This task

complements the individual work and fosters the capacity for integration in work groups.

For the development of all these activities, the e-learning platform (Virtual Classroom of the Universitat de València and / or PoliformaT of the Universitat Politècnica de València) will be used as a communication support with the students. Through it you will have access to the didactic material used in class, as well as the problems and exercises to solve.

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EVALUATION

To evaluate the students' learning, both in the first and in the second call, a final exam will be carried out that will include both theoretical questions and problems and that will have a weight in the final grade of 50%.

The rest of the grade will be obtained from the group work carried out by the students throughout the course (30%), as well as from the continuous evolution of each student (20%), based on regular attendance at classes, participation and degree of involvement of the student in the teaching-learning process, etc.

To do average, it will be necessary to obtain 5 points out of 10 in group work and in the final exam, both in the theory part and in the problems. Students who do not pass the exam in first call will have to take all parts of the exam (theory and problems) in second call. Moreover, students who do not pass the group work in first call will have to repeat the group work in second call. To pass the course it will be necessary to obtain an average grade of at least 5 points out of 10.

The planned activities that the student must carry out outside of face-to-face assistance will be coordinated between the different subjects of the master's degree and under the supervision of the Master's Academic Coordination Commission.

In any case, the evaluation system will be governed by the provisions of the Regulation of *Avaluació i Qualificació of the University of Valencia per a títols de Grau i Màster* (http://links.uv.es/7S40pjF).

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

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