COURSE DATA

DATA SUBJECT

Code: 43820
Name: Prevention of industrial pollution
Cycle: Master's Degree
ECTS Credits: 3
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
2250 - Master's Degree in Environmental Engineering	Escola Tècnica Superior d'Enginyeria	2	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2250 - Master's Degree in Environmental Engineering	Prevención de la contaminación industrial	ELECTIVES

COORDINATION

JIMENEZ BENITEZ ANTONIO LUIS

SUMMARY

Prevention of industrial pollution is an optional subject of 3 credits that is taught in the first semester of the second year of the Master in Environmental Engineering.

This subject aims to provide students with the knowledge and basic technical skills to analyze and project studies aimed to minimize industrial pollution. The students make use of the previous knowledge gained from different related core subjects: Water treatment; Control of atmospheric contamination; Management of contaminated soils and sediments; Analysis and application of environmental legislation and environmental impact assessment. This prior knowledge is taken as a starting point and is complemented by a description of the types and origins of pollution caused by industries in their production processes and the drafting of a series of tools and methodologies necessary to diagnose and carry out prevention studies. Students must be able to apply knowledge about the best available techniques, perform the analysis and environmental diagnosis of production processes, use minimization strategies and clean production, and apply recycling and recovery systems. The knowledge and skills acquired in this subject can be applied to any type of industry.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

No enrollment restrictions have been specified with other subjects of the curriculum.

COMPETENCES / LEARNING OUTCOMES

-

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.

Apply tools for environmental assessment and management including environmental impact assessment and environmental risk assessment.

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 and apply mathematical models for the simulation, optimisation or control of processes in the field of environmental engineering.

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.

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. Integrated pollution prevention and control

Introduction to industrial pollution. Industry-environment interactions. Industrial sustainability. Green Industry. Industrial Ecology. Legal framework, the IPPC Directive. Best available techniques.

2. Analysis and environmental diagnosis of production processes.

Sources of contamination in the industry, origin and characterization. Mass and Energy balances in industry. Flowsheet analysis. Environmental diagnosis of prevention and minimization opportunities.

3. Minimization strategies and clean production.

Clean Production: incentives and barriers. Clean Production Techniques: Changes in product, substitution of raw materials, good practices, process modifications, recovery in origin. Integration of Clean Production in the company.

4. Case studies.

Practical cases of prevention and minimization of industrial pollution.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	6,00
Theoretical and practical classes	2,00
Seminar	2,00

Computer classroom practice	12,00
Classroom practices	8,00
Total hours	**30,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	30,00
Independent study and work	10,00
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	5,00
Total hours	**45,00**

TEACHING METHODOLOGY

- Theoretical activities.

In the theoretical classes the topics will be developed providing a global and integrative vision, analyzing in greater detail the key and more complex integrating, analyzing in greater detail the key and more complex aspects, encouraging, at all times, the student's participation.

- Practical activities.

They complement the theoretical activities with the objective of applying the basic concepts and expanding them with the knowledge and experience acquired during the realization of the proposed works. Learning through problem solving, exercises and case studies through which competences on the different aspects of the subject are acquired.

- Work in the computer classroom.

Learning through activities developed individually or in small groups and carried out in computer classrooms. Resolution of case studies through which competences on the different aspects of the subject are acquired.

- Personal work of the student.

Resolution of practical cases, and autonomous study and work. This task will be carried out individually and

tries to promote autonomous work.

- Work in small groups.

Work in small groups (2-4 students), including problem solving outside the classroom. This task complements the individual work and promotes the capacity of integration in work teams.

- Evaluation.

Individual evaluation tests in the classroom with the presence of the teacher. teacher's presence.

- Use of resources.

The e-learning platform (Virtual Classroom of the University of Valencia) will be used as a support for communication with students. Through it, students will have access to the didactic material used in class, as well as the problems and exercises to be solved.

EVALUATION

To evaluate student learning, first of all, the objective testing methodology will be used, consisting of one or several exams that will consist of both theoretical-practical questions and problems, with a weight of 30% in the final grade.

The rest of the grade will be obtained from the evaluation of the practical activities based on the preparation of works, reports, study of practical cases and/or oral presentations, with a weight in the final grade of 60%, as well as the continuous evaluation of each student, based on the participation and degree of involvement of the student in the teaching-learning process, taking into account the regular attendance at the planned face-to-face activities and the resolution of activities and problems proposed periodically, with a weight in the final grade. of 10%.

To pass the objective test it will be necessary to achieve a 50 out of 100 in the exam(s), with a minimum grade of 40 out of 100 in each of its parts to be able to average. It will also be necessary to achieve a 50 out of 100 in each of the practical activities proposed to pass the subject.

The planned activities that the student must carry out outside of face-to-face attendance 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 Regulations for Assessment and Qualification of the University of Valencia for Degree and Master Degrees (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).

REFERENCES

- Manuals de cogestió (Generalitat de Catalunya)
- Tratamiento de aguas industriales: Aguas de proceso y residuales. Miguel Rigola Lapeña. Marcombo, Cop. (1989).
- Tratamiento de vertidos industriales y peligrosos. Nemerow. Diaz de Santos. (1998)
- Producció més neta. Miquel Rigola. Generalitat Catalunya. (1998)
- Manual de prevención de la contaminación Industrial. Freeman. McGraw-Hill (1998)
- Industrial water reuse and wastewater minimization. Mann. Ed. McGraw-Hill. (1999)
- Pollution Prevention through Process Integration. El-Halwagi. Ed. Academic Press. (1997)
- Waste minimization through process design. Rossiter. Ed. McGraw-Hill. (1995)
- Aguas residuales industriales: Minimización y tratamiento. Consejo de Cámaras de Comercio de la Comunidad Valenciana. (1994)
- Residuos industriales: Minimización y tratamiento. Consejo de Cámaras de Comercio de la Comunidad Valenciana. (1994)
- Contaminación e Ingeniería Ambiental. Bueno J.L. FICYT. Oviedo. (1997)
- Hazardous Waste Managenment. LaGrega, M.D y col. Waveland Pr Inc. (2001)

- Elías, X. (2009) Reciclaje de residuos industriales. Residuos sólidos urbanos y fangos de depuradora.

- Guias tecnológicas, BREFs, mejores técnicas disponibles

- Libros blancos sectoriales (IHOBE, Gobierno Vasco)

- Revista Reútil (Consejo de Cámaras)