COURSE DATA

DATA SUBJECT

Code: 33115
Name: Industrial pollution prevention
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1104 - Degree in Environmental Sciences	Facultat de Ciències Biològiques	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1104 - Degree in Environmental Sciences	Industrial pollution prevention	ELECTIVES

COORDINATION

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SUMMARY

Industrial Pollution Prevention is a four-month elective course taught in the fourth year of the Bachelor's Degree in Environmental Sciences during the first semester. The current curriculum consists of a total of 6 ECTS credits.

The general objectives of the course are to understand the different types of pollution caused by industrial activity, as well as the tools available to minimize such pollution, in compliance with current regulations.

The specific objectives of the course are:

- To understand the interaction between industry and the environment and to gain awareness of the problems of industrial pollution, as well as the need for cleaner production.
- To identify the origin of the waste generated (liquid, solid, and gaseous) and the associated environmental problems, as well as the techniques available for their prevention.
- To identify the origin of pollution caused by noise, energy consumption, radiation, etc., in the development of industrial activity.
- Locate available information on the production processes developed in the main industrial production sectors and interpret this information with a view to clean production and waste minimization.
- Develop clean production, ecodesign, and waste minimization methodologies to address the

specific environmental problems of each industrial process.
- Establish specific solutions for specific industries, as well as integrated actions following the methodology studied.

The course contents are:

- Waste minimization in industry.
- Wastewater in industry.
- Industrial waste.
- Air emissions from industry.
- Other sources of industrial pollution.
- Product-based industrial pollution prevention.
- Process-based industrial pollution prevention.
- Environmental trends.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

It is recommended that the student has acquired basic knowledge of physics and chemistry and have completed or be studying the subject "Technologies for pollution control" that is taught in the third year of the Degree in Environmental Sciences.

COMPETENCES / LEARNING OUTCOMES

1104 - Degree in Environmental Sciences

Capacidad de aplicar los procedimientos de análisis y diagnóstico medioambiental en los procesos de producción y evaluar las estrategias de minimización y producción limpia.

Capacidad de diseñar estrategias empresariales que permitan integrar de forma transversal la dimensión ambiental en la gestión empresarial.

Capacidad de elaborar memorias de sostenibilidad para organizaciones.

Capacidad de utilizar instrumentos de prevención y control contaminación: autorización ambiental integrada y comercio de derechos de emisión.

DESCRIPTION OF CONTENTS

1. Waste Minimization in Industry

- Waste Minimization Program.
- Environmental Assessment of Minimization Opportunities.

2. Wastewater in Industry

- Water Uses in Industry.
- Identification of Industrial Wastewater.
- Management of Contaminated Water: Fees, Reuse, Discharges.

3. Industrial Waste

- Industrial Waste.
- Identification and Cataloging of Industrial Waste.
- Industrial Waste Management: Communications, Storage, Management.

4. Air Emissions from Industry

- Main Air Pollutants.
- Air Quality Requirements: Measurements.
- Management of Industrial Emissions: Integrated Environmental Authorization, Best Available Techniques, Emissions Registry, Carbon Footprint.

5. Other Sources of Industrial Pollution

- Radioactive Pollution.
- Electromagnetic Pollution.
- Noise pollution.
- Soil pollution.
- Thermal pollution.

6. Product-based industrial pollution prevention

- Pricing mechanisms.
- Greener consumption: Ecolabels.
- Business leadership: Ecodesign. Life Cycle Assessment.
- Environmental Management Systems: ISO 14001 Standard. EMAS Regulation.
- Sustainability Reports.

7. Process-based industrial pollution prevention

- Internal changes in industrial processes.
- Industrial process redesign.

- Industrial process control and simulation.

8. Environmental trends

- Cleaner production (industrial technology).
- Eco-efficiency (industrial efficiency).
- Industrial ecology (industrial symbiosis).

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	3,00
Theory	36,00
Computer classroom practice	9,00
Classroom practices	12,00
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	8,00
Preparation of lessons	30,00
Preparation for assessment activities	17,00
Resolution of case studies	15,00
Total hours	**90,00**

TEACHING METHODOLOGY

The development of the subject is structured around four axes:

- Theoretical master classes: A global vision of the topic covered will be offered and key concepts for understanding it will be emphasized. Likewise, you will be informed of the most recommended resources for subsequent in-depth preparation of the topic.
- Problem solving classes (practices): In these sessions, examples and practical applications will be presented, problems will be solved and presentations and group work will be carried out in order to enhance the assimilation of the concepts introduced. The objective of classroom practices is to deepen the content and reinforce the knowledge and theoretical concepts covered in the subject.
- Computer classroom classes: Students will carry out, in groups, a preliminary waste minimization project for a selected real company. In this project, the knowledge acquired throughout the subject must be applied.

- Carrying out theoretical and practical exams: Variable content according to the theory and practical classes, depending on the options that may arise.

EVALUATION

The evaluation of the subject is structured around three parameters:

- 70% of the overall grade will be obtained from the individual evaluation of the knowledge acquired, by taking an exam.
- 20% of the overall grade will be obtained through the group evaluation for the completion and presentation of the mandatory work developed in the computer classroom classes.
- 10% of the overall grade will be obtained through the group evaluation for the completion and presentation of the work developed in the theory classes.

Collaboration and active participation (or, on the contrary, bad behavior or lack of education) during the course of the subject may lead to an adjustment of the grade.

The subject will be considered passed when the weighted average grade is equal to or greater than 5 (out of 10), as long as the exam obtains a grade equal to or greater than 4 (out of 10).

To request the advance call for this subject, the student must have completed the mandatory activities indicated in this guide.

REFERENCES

Basics

- Análisis del Ciclo de Vida: Aspectos Metodológicos y Casos Prácticos. Gabriela Clemente, Neus Sanjuán y José Luis Vivancos (Universidad Politécnica de Valencia, 2005)
- Diagnóstico Ambiental de Oportunidades de Minimización (Generalitat de Catalunya, 2000)
- Ecodiseño. Ingeniería del ciclo de vida para el desarrollo de productos sostenibles. Salvador Capuz Rizo y Tomás Gómez Navarro (Universidad Politécnica de Valencia, 2002)
- Ingeniería Ambiental. Gerard Kiely (McGraw-Hill, 1999)
- Llibre Didàctic d¿Anàlisi del Cicle de Vida (ACV). Rita Puig (Xarxa Temàtica Catalana d¿ACV, 2002)
- Manual Práctico de Ecodiseño (IHOBE, 2024)
- Norma ISO 14006. Sistemas de gestión ambiental. Directrices para incorporar el ecodiseño (AENOR, 2020)
- Norma ISO 14021. Etiquetas y declaraciones ambientales. Afirmaciones ambientales autodeclaradas. Etiquetado ambiental tipo II (AENOR, 2017)
- Norma ISO 14024. Etiquetas y declaraciones ambientales. Etiquetado ambiental Tipo I. Principios y procedimientos (AENOR, 2018)

- Norma ISO 14025. Etiquetas y declaraciones ambientales. Declaraciones ambientales tipo III. Principios y procedimientos (AENOR, 2010)
- Norma ISO 14040. Gestión ambiental. Análisis del ciclo de vida. Principios y marco de referencia (AENOR, 2006)
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Complimentary

- Análisis del ciclo de vida. Pere Fullana y Rita Puig (Rubes, 1997)
- Ecodiseño y Ecoproductos. Joan Rieradevall y Joan Vinyets (Rubes, 1999)
- Industrial water reuse and wastewater minimization. James Mann (McGraw-Hill, 1999)
- Manual de Prevención de la contaminación Industrial. Harry M. Freeman (McGraw-Hill, 1998)
- Organic Waste Recycling. Technology, Management and Sustainability. Chongrak Polpreasert & Thammarat Koottatep (IWA Pubblishing, 2007)
- Pollution Prevention through Process Integration. Mahmoud El-Halwagi (Academic Press, 1997)
- Producció + Neta. Miquel Rigola (Rubes, 1998)
- Waste Minimization Through Process Design. Alan P. Rossiter (McGraw-Hill, 1995)