COURSE DATA

DATA SUBJECT

Code: 34769
Name: Environmental pollution engineering
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1401 - Degree in Chemical Engineering	Escola Tècnica Superior d'Enginyeria	3	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1401 - Degree in Chemical Engineering	Engineering of environmental pollution	COMPULSORY

COORDINATION

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SUMMARY

The course *Environmental Pollution Engineering* aims to provide students with an understanding of the fundamentals and application of available technologies for the management and treatment of process and wastewater, solid waste, and atmospheric emissions.

It is a compulsory, semester-long course taught in the third year of the Bachelor's Degree in Chemical Engineering, during the second semester. According to the current curriculum, the course carries a total of 6 ECTS credits.

Building upon knowledge acquired in basic and core Chemical Engineering subjects-particularly the *Environment and Sustainability* course taken in the previous academic year -this subject introduces the necessary concepts for identifying and proposing technical solutions to environmental problems.

The course takes a global and integrated approach to the various systems for water treatment and wastewater purification, solid waste management and treatment, soil remediation, and air pollution control.

General objectives of the course:

- Introduce the criteria for evaluating water quality.
- Describe the various physical and chemical processes for water treatment, as well as the biological processes used in wastewater treatment.
- Ensure students understand the issues associated with sludge production in treatment plants and are familiar with the alternatives for its treatment.
- Present the criteria for air quality assessment and the available measurement and control techniques.
- Describe the technologies used for controlling air pollution.
- Explain the techniques for managing and treating different types of solid waste.
- Present the origins and challenges of soil contamination.
- Describe the technologies used for soil remediation.

Course content is organized into four main blocks:

- **Water quality management**: Water quality assessment. Physical, chemical, and biological water treatment processes. Sludge production and treatment. Treatment schemes.
- **Air pollution**: Air quality measurement and control techniques. Treatments for the removal of atmospheric pollutants.
- **Solid waste**: Management of municipal solid waste. Treatments for separation and recovery of solid waste. Final disposal systems.
- **Soil contamination**: Origins and issues. Treatment systems and remediation of contaminated soils.

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 the skills of the core subjects of Chemical Engineering (Basis of Chemical Engineering) and the subject Environment and Sustainability course, as well as the contents of Unit Operations and Engineering Chemical Reaction addressed in previous semesters.

COMPETENCES / LEARNING OUTCOMES

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Ability to handle specifications, regulations and standards of compliance.

Act autonomously in learning, make informed decisions in different contexts, issue judgements based on experimentation and analysis and transfer knowledge to new situations.

Analyse, design, simulate and optimise processes and products.

Analyse and evaluate the social and environmental impact of technical solutions.

Be able to understand and apply the legislation required for the practice of the profession of technical industrial engineer.

Contribute to the design, development and implementation of solutions that respond to social demands, guided by the Sustainable Development Goals.

Demonstrate critical and self-critical thinking, considering professional ethics, moral values and social implications of the different activities carried out throughout the degree.

Knowledge for carrying out measurements, calculations, valuations, appraisals, expert opinions, studies, reports, work plans and other similar work.

Propose creative and innovative solutions to complex situations or problems, specific to the field of knowledge, to respond to diverse professional and social needs.

Solve problems with initiative, make decisions, think creatively and critically, and communicate and convey knowledge, skills and competences in the field of industrial engineering.

Understand material and energy balances, biotechnology, mass transfer, separation operations, chemical reaction engineering, reactor design, and the valorisation and transformation of raw materials and energy resources.

Work in a multilingual and multidisciplinary environment.

DESCRIPTION OF CONTENTS

1. Water quality management

Unit 1. Water quality parameters: Physical, chemical and biological characteristics.
Unit 2. Physical treatment of waters.
Unit 3. Chemical treatment of waters.
Unit 4. Physical and chemical treatment of sludge.
Unit 5. Biological treatment of wastewater: processes of suspended-growth and attached-growth.

2. Air pollution

Unit 6. Air quality: Air pollutants. Measurement and monitoring of air pollution.
Unit 7. Air pollution control: Technologies for removing particles. Technologies for removing gaseous pollutants.

3. Solid wastes

Unit 8. Solid waste management: Classification and origin. Collection and transportation.
Unit 9. Solid waste treatment: Waste separation and processing. Technologies for solid waste recovery: composting, biogas production and incineration. Landfills.

4. Soils contamination

Unit 10. Soil quality: Sources of contamination. Characterization of contamination.
Unit 11. Treatment of contaminated soils: Contaminant immobilization techniques. Techniques for the recovery of contaminated soils.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	32,00
Classroom practices	28,00
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	15,00
Preparation of lessons	40,00
Preparation for assessment activities	15,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

Theory classes: In the theoretical classes, the main methodology will be the lecture format. The teaching staff will present the contents of each topic through presentations and/or explanations, emphasizing the key aspects for their proper understanding.

Practical activities:
The practical classes will complement the theoretical activities with the aim of applying the basic concepts and expanding them through the knowledge and experience gained during the completion of the proposed tasks. These activities will take place in the classroom or in small groups. They include the following types of face-to-face activities:

- Problem-solving and questions in the classroom: The teacher will explain a series of typical problems that allow students to acquire the necessary skills to analyze, pose, and solve the problems related to each topic. Students' decision-making skills will be encouraged.
- Discussion and problem-solving or task sessions: In these sessions, carried out in small groups, a series of exercises or tasks previously proposed by the teacher and worked on by students in small groups will be analyzed and discussed.

EVALUATION

Evaluation modality A:

Student learning assessment will be carried out through continuous assessment and a final assessment.

- **Continuous assessment:** It will be based on the student's participation in the teaching-learning process, taking into account the resolution of questions and problems proposed in class, individually and/or in small groups. This will account for **25%** of the final grade. Activities not submitted by the scheduled date cannot be submitted later.
- **Final assessment:**
    - A Partial Exam will be held at the end of **Block 1** (Water Quality Management), consisting of theoretical-practical questions and problems, with the purpose of verifying the assimilation of the basic concepts of the block.
    - On the official date of the first call, the exam for the remaining blocks (**Block 2, Block 3, and Block 4**) will be held, consisting of theoretical-practical questions and problems aimed at verifying the assimilation of all basic concepts of these blocks.
    - To average the scores obtained in the exams with continuous assessment, it will be necessary to obtain a minimum of 3 points (out of 10) in each of the parts (theory and problems), considering the scores of both exams.
    - The final assessment will represent **75%** of the final grade. This evaluation will take into account the scores obtained in the exams taken.

In the second call, students will be examined on all blocks of the subject, regardless of the grades obtained in previous exams.

Evaluation modality B:

As an alternative to the evaluation method described above, the assessment may be carried out through a single exam that will have a weight of 100% of the final grade and will be held on the official date of the first call. The minimum scores required in each part of the exam will be the same as in Modality A.

In both modalities, to pass it will be necessary to obtain an average grade of 5 out of 10, provided that in the exams a grade equal to or higher than 5 points (out of 10) is obtained.

Copying or manifest plagiarism of any evaluable activity will result in the impossibility of passing the

subject, and the student will be subject to the disciplinary procedures established in the **PROTOCOL FOR ACTION AGAINST FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALÈNCIA (ACGUV 123/2020)**.

In any case, the evaluation system will be governed by the provisions of the **Regulations on assessment and grading of the University of Valencia for bachelor's and master's degrees (ACGUV 108/2017).**

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