Environmental Technology

Code: 106049
ECTS Credits: 6

2025/2026

Degree	Type	Year
Chemical Engineering	OB	3

Contact

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Basic knowledge on material and energy balances and reaction stoichiometry.

Objectives and Contextualisation

The general objective of this subject is to introduce students to the environmental problems, their management and the technical and methodological solutions to minimize them. With this objective, different methodologies to prevent and reduce the generation of the environmental impacts caused by the human activities and the main technologies of treatment of waters, emissions and waste will be studied.

At the end of the course the student must be able to:

Explain the concept of environmental pollution and its impact on the environment,

Explain and use basic methodologies of environmental prevention,

Recognize and describe the main pollutants and the analytical parameters used to measure them, as well as their effects on the environment,

Interpret a residual water analysis and propose a logical combination of treatment operations to purify and / or reuse it,

Physic-chemical processes design for water treatment,diseñar procesos físico-químicos para el tratamiento de aguas,

Analyse criteria for the selection and design of activated sludge systems

Interpret an analytic of an emission into the atmosphere and propose a logical combination of treatment operations todebug it,

Describe the operation, characteristics and scientific bases of treatment operations and facilities for water treatment, water purification, waste treatment and emissons treatment.

Competences

- Communication
- Develop personal work habits.
- Show an understanding of the role of chemical engineering in the prevention and resolution of environmental and energy problems, in accordance with the principles of sustainable development.
- Understand and apply the basic principles on which chemical engineering is founded, and more precisely: balances of matter, energy and thermodynamic momentum, phase equilibrium and kinetic chemical equilibrium of the physical processes of matter, energy and momentum transfer, and kinetics of chemical reactions

Learning Outcomes

1. Analyse the meaning of environmental parameters.
2. Apply chemical engineering to the prevention of environmental and energy problems in accordance with the principles of sustainable development and applied to the different production processes of the main inorganic and organic products in the different sectors of industrial chemistry.
3. Apply environmental and technological risk the evaluation procedures.
4. Apply matter and energy balance to typical continuous and discontinuous environmental engineering systems.
5. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
6. Identify and enunciate environmental problems.
7. Work autonomously.

Content

THEME 1.- Introduction

Concept of pollution and pollutant. Cycles of matter and pollution. The role of the Chemical Engineer in sustainable development. Hierarchy in waste management. Social control of pollution and environmental legal framework.

THEME 2.- Environmental management systems

Legal framework, authorisation, licensing and environmental communication. Best available techniques. Waste management hierarchy. Registration of atmospheric emissions. Industrial ecology, industrial metabolism. Green engineering. Life cycle analysis.

THEME 3.- Introduction to wastewater treatment.

Characterisation of wastewater: physicochemical and biological parameters. Introduction to wastewater treatment, generation, quality and management. Potabilisation and purification.

THEME 4.- Pre-treatments and physico-chemical treatments.

Separation processes of coarse solids, sedimentation (equipment and design criteria), flotation, filtration. Chemical treatments: chemical precipitation, coagulation, flocculation, adsorption, reverse osmosis, disinfection.

THEME 5.- Fundamentals of biological wastewater treatment processes.

Removal of organic matter and nitrogen. Introduction and design of the activated sludge process. Modifications of the conventional process. Suspended biomass and immobilised biomass processes. Introduction to anaerobic digestion of wastewater.

THEME 6.- Solid waste treatment.

Industrial waste and urban waste. Quality parameters and legislation. Anaerobic digestion and composting. Pre- and post-treatment in the treatment of urban waste.

THEME 7.- Treatment of atmospheric emissions.

Types and origin of atmospheric pollutants. Particles and gases. Emission and immission. Particle elimination operations: sedimentationchambers, cyclones, bag filters, washing towers, electrostatic precipitators. Gaseous pollutant removal operations: absorption, adsorption, incineration and biofiltration.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problem classes	15	0.6	1, 4, 3, 2, 6
Technical visits	5	0.2	2, 6
Theory classes	30	1.2	1, 4, 3, 2
Type: Autonomous			
Group work	14	0.56	5
Problem resolution and study	74	2.96	1, 4, 3, 2, 6, 7

The following teaching tools will be used throughout the course:

- Theoretical lectures and cases resolution: The student acquires their own knowledge of the subject attending theoretical lectures and cases resolution, complementing them with the individual study of the topics explained. Apart from theory classes, there will also be sessions of case studies and problems resolution.
- Technical visits (if the budget allows): They will be an additional tool for reviewing and consolidating the work done in theoretical classes.
- Autonomous and collaborative study and resolution of cases: These are autonomous activities that will serve the student to consolidate the knowledge acquired in the theoretical activities and develop the corresponding competences. The contents of this material will be evaluated in the examinations of the subject.
- Group homework: Students will carry out a group homework on topics that the teacher will propose. The works will be part of the subject.

Schedule of attention to the students

The attention will be held after class or during a scheduled time between the student and the teacher.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
First Partial exam	45%	3	0.12	1, 3, 2, 6, 7
Group work	15%	0	0	3, 2, 5
Recovery Test	85%	6	0.24	1, 3, 6, 7
Second Partial exam	40%	3	0.12	1, 4, 3, 2, 6

This subject does not foresee unique evaluation system.

A) Continuous Evaluation

The evaluation of the course will be based on three evaluation activities: two midterm exams and a group project.

- The first midterm will cover Topics 1, 2, 3, and 4 and will take place during the regular class period (midterm period). This exam will account for 45% of the final course grade.
- The second midterm will cover Topics 5, 6, and 7 and will be scheduled according to the official exam calendar of the degree program. This exam may include content previously assessed in the first midterm. It will account for 40% of the final course grade.
- Group project: A group project will be conducted, contributing 15% to the final course grade. The project topics will be proposed by the teaching staff and will form part of the material evaluated in the midterms.
The content assessed in the 1st and 2nd midterms will include both the material explained in class and the content of the group projects, which will be uploaded to the Moodle classroom.

A minimum grade of 3.5 (out of 10) will be required in each assessment activity (both midterms and the group project) in order for the grades to be averaged into the final grade. If the minimum grade is not achieved in any of the assessed activities, the student must retake it, provided they meet the conditions specified in section "B) Resit". The group project grade, if failed, cannot be retaken.

An average grade of 5.0 will be needed to pass the subject.

B) Resit

Students may sit the resit exam if they have completed assessment activities that represent at least two-thirds of the total course grade. Furthermore, the average grade of all course activities must be equal to or greater than 3.5 out of 10.

The resit exam will be divided into two parts: one covering Topics 1, 2, 3, and 4, and the other covering Topics 5, 6, and 7. In both parts, the material developed in the group projects and uploaded to Moodle will also be included. The date for this exam will be specified in the degree program's exam calendar.

The final grade of the course will be calculated in the same way as in the continuous assessment.

C) Review of Grades

For each evaluation activity, a specific place, date, and time for grade review will be announced, during which students may review the activity with the instructor. Students may appeal their grades during this review period, and the appeals will be assessed by the teaching team responsible for the course. If the student does not attend the scheduled review, no further review of that activity will be allowed.

D) Grades

Distinction (Matrícula d'Honor): Awarding a distinction is at the discretion of the course instructor. According to UAB regulations, distinctions can only be awarded to students with a final grade equal to or greater than 9.00. Up to 5% of enrolled students may receive this distinction.

A student cannot receive a distinction if they have taken the re-sit exam (in whole or in part).
For students who retake only part of the course, the final grade will be calculated based on the percentages established in the continuous assessment section.
A student will be considered "Not Assessable" (NA) if they have not completed assessment activities representing at least two-thirds of the total course grade.

E) Irregularities: Cheating and Plagiarism

Without prejudice to any disciplinary measures deemed appropriate, any irregularities committed by a student that may affect the grade of an assessment activity will result in a grade of zero for that activity. This includes copying, plagiarism, cheating, allowing others to copy, etc. Any assessment activity graded in this manner will <strongdata-start="3796" data-end="3826">not be eligible for resit. If passing the activity is required to pass the course, the student will fail the course with no opportunity for recovery during the same academic year.

F) Group Project

The project topic may be chosen from a list proposed by the teaching staff. On the first day of class, the method for assigning projects to each group and the submission deadlines will be explained.

The projects must be uploaded to Moodle and will be included in the course assessment.

This evaluable activity cannot be retaken.

G) Grade repeaters

Grade repeaters will follow exactly the same evaluation procedure.

H) Permitted Use of Artificial Intelligence (AI)

In this course, the use of Artificial Intelligence (AI) technologies is permitted as part of the development of the group project, provided that the final outcome reflects a significant contribution from the student in terms of analysis and personal reflection. The student must clearly identify which parts were generated using such technology, specify the tools used, and include a critical reflection on how these tools influenced the process and final result of the activity. Lack of transparency in the use of AI will be considered a breach of academic integrity and may result in a penalty in the activity grade or more severe sanctions in serious cases.

Bibliography

- Metcalf & Eddy. Ingenieria de aguas residuales. Tratamiento vertido i reutilización. McGraw Hill Inc. 1998
- Peavy, H.S., Rowe, D.R., Tchobanoglous, G. Environmental Engineering. McGraw Hill Inc. 1985.
- Ramalho, R.S. Tratamiento de aguas residuales. Reverté, 1993

- Standard Methods for the examination of water and waste water. APAA-AWWA-WPCF Washington 1998 20ª Edició.
- Hernández Muñoz, A. Manual de depuración Uralita. Editorial Paraninfo. 1996
- Dullien, F.A.L. Introduction to industrial gas cleaning. Academic Press, Inc. 1989.
- Wark, K., Warner, C.F. Contaminación del aire. Origen y control. Ed. Limisa. 1998.
- Theodore, L., Buonicore, A. Air pollution control equipment. Selection, design, operation and maintenance. Springer-Verlag. 1994.
- Seinfeld, J.H., Atmospheric Chemistry and Physics of Air Pollution. Ed. Jhon Wiley and Sons. 1986.
- Tchobanoglous, G., Theisen, H., Vigial, S.A. Gestión integral de residus sólidos. McGraw Hill Inc. 1996
- Nemerow, N.L., Dasgupta, A. Tratamiento de vertidos Industriales y peligrosos. Ediciones Díaz de Santos. 1998.
- Alfayate Blanco, J.M., Orozco Barrenetxea, C. Contaminación ambiental. Una visión desde la química. Ed. Paraninfo. 2002. ISBN 9788497321785

Software

none

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	211	Catalan	second semester	morning-mixed
(SEM) Seminars	211	Catalan	second semester	morning-mixed
(TE) Theory	21	Catalan	second semester	morning-mixed