Universitat Autònoma de Barcelona

2023/2024

Clean Technologies and Industrial Waste

Code: 102817
ECTS Credits: 6

Degree	Type	Year	Semester
2501915 Environmental Sciences	OT	4	0

Contact

Name: Gemma Canals Flix

Email: gemma.canals@uab.cat

Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject.
Please note that this information is provisional until 30 November 2023.

Teachers

Aglaia Gomez D Alessandro

Prerequisites

Fundamentals of Environmental Engineering and Circular Economy

Objectives and Contextualisation

• Knowing and applying the concepts of clean technologies and circular economy for the improvement of products and industrial processes
• Identify the available industrial effluent treatments and acquire basic notions for their design
• Select alternatives for the treatment of industrial effluents
• Describe the alternatives for the treatment of contaminants in gaseous effluents
• Identify remediation tools for contaminated soils and water

Competences

- Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
- Analyze and use information critically.
- Demonstrate adequate knowledge and use the most relevant environmental tools and concepts of biology, geology, chemistry, physics and chemical engineering.
- Demonstrate initiative and adapt to new situations and problems.

- Develop analysis and synthesis strategies regarding the environmental implications of industrial processes and urban management
- Information from texts written in foreign languages.
- Learn and apply in practice the knowledge acquired and to solve problems.
- Quickly apply the knowledge and skills in the various fields involved in environmental issues, providing innovative proposals.
- Teaming developing personal values regarding social skills and teamwork.
- Work autonomously

Learning Outcomes

1. Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
2. Analyze and use information critically.
3. Analyze, evaluate, design and operate systems or processes, equipment and facilities associated with environmental engineering in accordance with certain requirements, standards and specifications under the principles of sustainable development.
4. Apply relevant knowledge of basic sciences to enable compression, the description and the solution of typical problems of environmental engineering.
5. Apply the basic principles on which is based environmental engineering and, more specifically, mass and energy balances.
6. Apply the scientific method to systems in which chemical, physical or biological both macroscopic and microscopic scale transformations occur.
7. Demonstrate initiative and adapt to new situations and problems.
8. Design and implement waste management plans and waste water.
9. Identify the processes most appropriate to apply chemical engineering to environmental surroundings and to value them properly and originally.
10. Information from texts written in foreign languages.
11. Learn and apply in practice the knowledge acquired and to solve problems.
12. Objectively compare and select different technical alternatives of an industrial process with parameters of environmental sustainability.
13. Teaming developing personal values regarding social skills and teamwork.
14. Work autonomously

Content

1. Prevention of pollution: circular economy and clean technologies.

1.1. Introduction

1.2. Economy Circular and design Cradle to Cradle

1.3. Economic aspects

1.4. Methodology

1.5. Case studies

2. Treatment of industrial effluents

2.0. Characterization / fractionation of effluents

2.1. Anaerobic digestion

2.2. Advanced oxidation processes

2.3. Membrane Reactors (MBR)

2.4. Discontinuous sequential reactors (SBR)

3. Treatment of contaminants in gaseous effluents

3.0. Introduction to the treatment of gases

3.1. Elimination of particles

3.2. Physicochemical treatments

3.3. Biological treatments

4. Bioremediation

4.1. In-situ and ex-situ treatments

4.2. Physico-chemical treatments

4.3. Biological treatments

Methodology

Theoretical classes: Master classes on the topics of the syllabus.
Problem classes: Resolution of case studies corresponding to the subject. Discuss with the students about the solution strategies and their execution.
Seminars: Meetings of small groups of students with the teacher to clarify doubts, one hour per subject.

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problem classes: Resolution of case studies corresponding to the subject	13	0.52	3, 4, 6, 5, 11, 9, 14
Seminars: Meetings with small groups for study of specific topics	5	0.2	2, 4, 5, 11
Theoretical classes: Master classes on the topics of the syllabus	30	1.2	2, 3, 4, 6, 5, 12, 9, 10
Type: Autonomous			
Collaborative learning	32	1.28	2, 11, 12, 9, 10, 1, 13
Self-contained learning of the student	55	2.2	2, 3, 4, 6, 5, 11, 12, 7, 9, 10, 14

Assessment

Continuous assessment

The contents of this subject will be evaluated through different works and written tests to be carried out during the course:

- Two written tests with a theoretical and practical part (50%)
- Case resolution works (50%)

A final minimum mark of 5.0 is required to pass, but to make the average, the mark of each written test must be higher than 3.5.
Not participating in any of the activities will be valued at zero.
If none of the two written tests are carried out, the final grade will be "Not evaluable".

To ask for a reevaluation the student must have been received a mark in activities that represent at least 2/3 of the global mark during the course.

Single Assessment

Students who have accepted the single assessment modality will have to take a final test which will consist of a theory exam where they will have to answer a series of short questions and develop a couple of topics. When you have finished, you will hand in the internship reports.

The student's grade will be the weighted average of the previous activities, where the theory exam will account for 50% of the grade, and each of the practice reports 10%.

If the final grade does not reach 5, the student has another opportunity to pass the subject through the remedial exam that will be held on the date set by the degree coordinator. In this test you can recover 70% of the grade corresponding to the theory. The practice part is not refundable

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Case Studies	50%	11	0.44	2, 3, 4, 6, 5, 11, 12, 7, 8, 9, 10, 1, 13
Two written tests with a theoretical and practical part	50%	4	0.16	2, 3, 4, 6, 5, 11, 12, 7, 9, 1, 14

Bibliography

Ellen McArthur Foundation, https://www.ellenmacarthurfoundation.org/publications

Cradle to Cradle Products Innovation Institute (C2CPII), http://www.c2ccertified.org/

Cradle to Cradle Certified™ Product Standard, http://www.c2ccertified.org/resources/detail/cradle_to_cradle_certified_product_standard

Centre d'Activitat Regional pel Consum i la Producció Sostenible (SCP/RAC). http://www.cprac.org/ca/mediateca

United Nations Environment Programme

Metcalf & Eddy Inc. Wastewater Engineering: Treatment and Reuse. 4th Edition. Ed. Mc. Graw-Hill Inc., N.Y. (2003).

C. Kennes, M.C. Veiga. Bioreactors for Waste Gas Treatment. Kluwer Academic Publishers. (2001).

Simon Parsons. Advanced Oxidation Processes for Water and Wastewater Treatment. IWA Publishing. (2004).

Nazik Artan, Derin Orhon. Mechanism and Design of Sequencing BatchReactors for Nutrient Removal. IWA Publishing. (2005

Software

.