

Water Potabilization and Urban Waste Water Treatment

Code: 102430
ECTS Credits: 5

Degree	Type	Year	Semester
2500897 Chemical Engineering	OT	4	0

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

Oscar Jesus Prado Rubianes

Prerequisites

Completing the course "Environmental Engineering" is recommended before taking this course.

Objectives and Contextualisation

The main objective of the course is that the student is able to integrate the previous knowledge of chemical engineering and environmental engineering to design the most common operating units in the processes of wastewater treatment. In addition, the student must acquire a critical spirit to be able to assess the different alternatives that exist in these treatments and to know how to propose the best option under different scenarios.

Competences

- Analyse, evaluate, design and operate the systems or processes, equipment and installations used in chemical engineering in accordance with certain requirements, standards and specifications following the principles of sustainable development.
- Develop personal work habits.
- Develop thinking habits.
- Objectively compare and select different technical options for chemical processes.
- Participate in the organisation and planning of companies.
- 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. Adapt to unforeseen situations.
2. Apply matter and energy balance to typical continuous and discontinuous environmental engineering systems.
3. Apply unitary operations to environmental processes.
4. Critically evaluate the work done.
5. Describe and explain in depth the technologies, tools and techniques applied to the treatment of industrial and urban solid waste and the production of sources of renewable energy
6. Design and calculate engineering solutions to environmental problems.
7. Develop a capacity for analysis, synthesis and prospection.
8. Objectively distinguish different alternatives in solid and industrial waste treatment plants and in the processes of obtaining renewable energies
9. Organise and schedule the management of an environmental problem, an installation or an environmental service.
10. Work with common equipment used in the treatment of environmental problems.

Content

This course is divided in nine parts:

1. Introduction to the problem of wastewater
2. Water purification
3. Pipes and pumping
4. Pretreatment
5. Primary treatment
6. Secondary treatment
7. Sludge management
8. Treatment of odours
9. Tertiary treatment and potabilization

Methodology

Theory classes. The basic theoretical concepts for the subsequent practical development are introduced in an orderly and concise manner.

Classes of problems. A series of problems is selected from the collection of each theme. The resolution step by step of the most representative problems is shown and the resolution scheme of other problems is presented. Resolution of problems by the students.

Seminars 1) Sludge line of a WWTP. 2) Disinfection processes

Visit to WWTP

The proposed teaching methodology and the examinations may undergo some modifications depending on the attendance restrictions imposed by the health authorities

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Drinking water production systems	13	0.52	2, 3, 7, 6, 10, 9
WWTP design	15	0.6	2, 3, 7, 6, 8, 10, 9
WWTP visit	4	0.16	9

Type: Supervised				
Problems subjects 1-5	8	0.32	2, 3, 5, 7, 6, 8, 10, 9	
Problems subjects 6-9	6	0.24	2, 3, 7, 6, 10, 9	
Type: Autonomous				
Group work 2. Design and criteria and elements of an unitary process	10	0.4	1, 2, 3, 4, 7, 6, 10, 9	
Group work. WWTP design	10	0.4	1, 2, 3, 4, 7, 6, 10, 9	
Problems resolution	25	1		
Theoretical fundamentals study	26	1.04		

Assessment

The evaluation will consist of two parts:

Two partial examinations (70%: 35% each partial) that can include a part of theory and one of problems. A minimum mark of 3.5 is needed in each one of the partial exams. Otherwise, it will be necessary to recover the partial suspended in the recovery exam.

Written work that will have to be presented orally in which some of the main units of a sewage treatment plant (30%) will be designed.

To participate in the recovery exam the students must have been previously evaluated in a set of activities whose weight equals to a minimum of two thirds of the total grade of the subject

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Group work	30	0	0	1, 2, 3, 4, 7, 6, 10, 9
Partial exam 1. Design of waste water purification processes	35	2	0.08	2, 3, 5, 7, 6, 8, 10, 9
Partial exam 2. Design of drinking water production systems	35	2	0.08	2, 3, 7, 6, 10, 9
Recuperation exam	70	4	0.16	2, 3, 5, 7, 6, 8, 10, 9

Bibliography

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