

Water Treatment

Code: 106064
ECTS Credits: 6

2024/2025

Degree	Type	Year
2500897 Chemical Engineering	OT	4

Contact

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

None

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

- Communication
- Develop personal work habits.
- Develop thinking 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 and evaluate processes in observance of sustainability criteria.
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. Develop scientific thinking.
7. Enumerate and describe the social factors involved in environmental solutions.
8. Identify the applicable environmental legislation on a local, regional and global scale.
9. Propose a logical sequence of technologies applicable to the resolution of an environmental problem.
10. Work autonomously.

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

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
WWTP systems design	28	1.12	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
WWTP visit	4	0.16	6, 10
Type: Supervised			
Problems resolution	14	0.56	2, 4, 6, 9
Type: Autonomous			
Group work. WWTP elements design	20	0.8	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Problems resolution	25	1	1, 2, 4, 6, 9, 10
Theoretical fundamentals study	49	1.96	4

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

Note: 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.

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Assessment

Continous Assessment Activities

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

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

Bibliography

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- M.L. Davis, D.A. Cornwell. Introduction to Environmental Engineering, 5 Ed. McGraw Hill Inc. Editions. th New York. 2008.
- C. Kennes, M.C. Veiga. Air Pollution Prevention and Control: Bioreactors and Bioenergy John Wiley & Sons Inc., Chichester. 2013.
- C. Menéndez-Gutiérrez, J.M. Pérez-Olmo. Procesos para el Tratamiento Biológico de Aguas Residuales Industriales. Ed. Universitaria. La Habana. 2007.
- Metcalf & Eddy, Inc. Wastewater Engineering: Treatment and Reuse. McGraw-Hill Inc. Editions. Boston. 2003.
- H.S. Peavy, D.R. Rowe, G. Tchobanoglous. Environmental Engineering. McGraw Hill Inc. Editions. N.Y. 1985.
- R.S. Ramalho. Tratamientos de Aguas Residuales. Editorial Reverté. Barcelona. 1993.
- M.C.M. van Loosdrecht, P.H. Nielsen, C.M. López-Vázquez, D. Brdjanovic. Experimental Methods in Wastewater Treatment. IWA Publishing. London. 2016.

Software

No specific software will be required.

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Spanish	first semester	morning-mixed
(SEM) Seminars	1	Spanish	first semester	morning-mixed
(TE) Theory	1	Spanish	first semester	morning-mixed

PROVISION