

Degree programme	Type	Course
Chemical Engineering	OP	4

Contact lecturer

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Teaching staff

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Group languages

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

Prerequisites

None

Objectives

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.

Learning outcomes

1. Apply matter and energy balance to typical continuous and discontinuous environmental engineering systems.
2. Analyse and evaluate processes in observance of sustainability criteria.
3. Identify and enunciate environmental problems.
4. Identify the applicable environmental legislation on a local, regional and global scale.
5. Propose a logical sequence of technologies applicable to the resolution of an environmental problem.
6. Develop scientific thinking.
7. Work autonomously.
8. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.

Contents

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. Tertiary treatment and potabilization
9. Future trends in water treatment

Learning activities and methodology

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

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, non mandatory

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.

Note: In this subject, the use of Artificial Intelligence (AI) technologies is allowed as an integral part of the development of the work, provided that the final result reflects a significant contribution by the student in the analysis and personal reflection. The student must clearly identify which parts have been generated with this

technology, specify the tools used, and include a critical reflection on how these have influenced the process and the final result of the activity. The lack of transparency in the use of AI will be considered a lack of academic honesty and may lead to a

penalization in the grade of the activity, or greater sanctions in serious cases.

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

Continuous assessment activities

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

This subject does not contemplate the single assessment system.

The evaluation will consist of two parts:

Two written 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 essay that will have to be presented orally in which some of the main units of a sewage treatment plant (30%) will be designed. The use of AI is allowed for the completion of written essay.

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.

Awarding an honors grade is the decision of the teaching staff responsible for the subject. The HG can only be awarded to students who have obtained a final grade equal to or greater than 9.00. Up to 5% of the total number of students enrolled can be awarded.

A student will be considered non-assessable (NA) if he/she has not presented a set of activities whose weight is equivalent to a minimum of two thirds of the total grade of the subject.

Without prejudice to other disciplinary measures that may be deemed appropriate, irregularities committed by the student that may lead to a variation in the grade of an evaluation act will be graded with a zero. Therefore, copying, plagiarism, cheating, allowing copying, unauthorized use of AI (e.g., Copilot, ChatGPT or equivalents), etc. in any of the evaluation activities will imply failing it with a zero. Assessment activities graded in this way and by this procedure will not be recoverable. If it is necessary to pass any of these assessment activities to pass the subject, this subject will be suspended directly, without the opportunity to recover it in the same year.

Repeating students may be exempt from carrying out the written essay, maintaining their grade, provided that it is higher than 5.

The review of exams and assignments will be carried out in person, on a date agreed with the teaching staff.

Bibliography

APHA/AWWA/WPCF. Standard methods for the examination of water and wastewater. 19th Ed.

American Public Health Association, Washington, D. C. 1995.

N.P. Cheremisinoff. Handbook of Water and Wastewater Treatment Technologies.

Butterworth-Heinemann. Boston. 2002

J.C. Crittenden, R.R. Trussell, D.W. Hand, K.J. Howe, G. Tchobanoglous. Water treatment: principles and design. John Wiley & Sons. Hoboken. 2005

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. Communication with the students will be carried out through the Virtual Campus.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	21	Catalan/Spanish	first	morning-mixed

semester				
(PAUL) Classroom practices	211	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	211	Catalan/Spanish	first semester	morning-mixed