

**1. General information****Course:** WATER TREATMENT TECHNOLOGIES AND PROCESSES**Code:** 37327**Type:** CORE COURSE**ECTS credits:** 6**Degree:** 340 - UNDERGRADUATE DEGREE PROGRAMME IN ENVIRONMENTAL SCIENCES**Academic year:** 2023-24**Center:** 501 - FACULTY OF ENVIRONMENTAL SCIENCES AND BIOCHEMISTRY**Group(s):** 40**Year:** 3**Duration:** C2**Main language:** Spanish**Second language:****Use of additional languages:****English Friendly:** Y**Web site:****Bilingual:** N**Lecturer:** CARLOS JIMENEZ IZQUIERDO - Group(s): 40

Building/Office	Department	Phone number	Email	Office hours
Sabatini/0.10	INGENIERÍA QUÍMICA	926051434	carlos.jimenez@uclm.es	Monday, Tuesday and Wednesday from 11:00 a.m. to 1:00 p.m., by appointment by email

Lecturer: JESUSA RINCON ZAMORANO - Group(s): 40

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Sabatini/0.15	INGENIERÍA QUÍMICA	5414	jesusa.rincon@uclm.es	Monday from 10 a.m. to 12 p.m. and Tuesday from 10 a.m. to 2 p.m., by appointment by e-mail

2. Pre-Requisites

Not established

3. Justification in the curriculum, relation to other subjects and to the profession

Not established

4. Degree competences achieved in this course**Course competences**

Code	Description
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
E03	Awareness of the temporal and spatial dimensions of environmental processes
E04	Ability to integrate experimental evidence found in field and/or laboratory studies with theoretical knowledge.
E24	Water resources management, supply and treatment capacity
T03	To use a correct oral and written communication.

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

To know the legislation and quality criteria related to environmental technologies.

Train the student to work as a team.

To enable the student to listen and defend arguments orally and in writing.

To enable the student to understand the fundamental principles that allow the selection of technologies and the design of the most appropriate equipment to address the solution of environmental problems.

To train the student in the correct management of energy, water and waste, becoming aware of social responsibility in decision making.

To train the student to understand the unitary operations used in environmental engineering.

To enable the student to solve problems and interpret the results in a critical way.

To enable the student to relate theoretical concepts to experimental evidence.

6. Units / Contents**Unit 1: WATER: GENERAL CONCEPTS****Unit 2: WATER CHARACTERISTICS AND QUALITY CRITERIA****Unit 3: OVERVIEW OF TREATMENT METHODS****Unit 4: BASIC CONCEPTS ON WATER SUPPLY****Unit 5: WATER SUPPLY TREATMENT****Unit 6: URBAN WASTEWATER TREATMENT****Unit 6.1 MUNICIPAL WASTEWATER TREATMENT PLANTS****Unit 6.2 LAND-BASED TREATMENTS**

7. Activities, Units/Modules and Methodology							
Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E03 E24	0.8	20	N	-	Master class.
Study and Exam Preparation [OFF-SITE]	Self-study	CB02 CB03 CB05 E03 E24	1.6	40	N	-	Autonomous study.
Workshops or seminars [ON-SITE]	Problem solving and exercises	CB02 CB03 CB04 CB05 E03 E24 T03	0.48	12	Y	N	Solution and discussion of exercises and problems.
Other off-site activity [OFF-SITE]	Problem solving and exercises	CB02 CB03 CB05 E03 E24 T03	1.2	30	Y	N	Preparation of seminars.
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB02 CB03 CB04	0.7	17.5	Y	Y	Experiments in the laboratory and visit to the treatment plant. Unrecoverable.
Practicum and practical activities report writing or preparation [OFF-SITE]	Practical or hands-on activities	CB02 CB03 CB04 E03 E04 E24 T03	0.8	20	Y	Y	Elaboration of a Report of the experiments carried out in the laboratory.
Field work [ON-SITE]	Case Studies	CB02 CB03 CB04 CB05 E03 E24 T03	0.16	4	Y	N	Visit to the local WWTP and critical analysis of the facility visited. The report is evaluated together with the Report of the laboratory experiments.
Mid-term test [ON-SITE]	Assessment tests	CB02 CB03 CB04 CB05 E03 E24 T03	0.08	2	Y	N	Partial exam.
Final test [ON-SITE]	Assessment tests	CB02 CB03 CB04 CB05 E03 E24 T03	0.18	4.5	Y	Y	Final exam.
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System			
Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Mid-term tests	14.00%	0.00%	- Progress test (problems). If a score equal to or greater than 4 out of 10 is obtained the test is passed. - In case of passing the test, its weight in the final grade of the subject will be 14%. - If the test is not carried out or not passed, its weight in the final grade of the subject will be 0%.
Laboratory sessions	7.00%	7.00%	The attitude, skill and knowledge are evaluated.
Practicum and practical activities reports assessment	8.00%	8.00%	The results obtained and the correctness of their presentation are evaluated.
Mid-term tests	28.00%	0.00%	- Progress test (theory). If a score equal to or greater than 4 out of 10 is obtained the test is passed. - In case of passing the test, its weight in the final grade of the subject will be 28%. - If the test is not carried out or not passed, its weight in the final grade of the subject will be 0%.
Final test	29.00%	57.00%	- The final test (theory) will consist of two parts. The first one corresponds to the subject evaluated through the progress test and the second one to the rest of the subject. - Students who have passed the progress test will not have to take the first part. - The weight of this final test on the final mark of the subject will be 56% if both parts are carried out and 29% if only the second part is performed.
Final test	14.00%	28.00%	- The final test (problems) will consist of two parts. The first one corresponds to the subject evaluated through the progress test and the second one to the rest of the subject. - Students who have passed the progress test will not have to take the first part. - The weight of this final test on the final mark of the subject will be 28% if both parts are carried out and 14% if only the second part is performed.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

In the qualification of the different sections, the level of development of the transversal and specific competences raised above will be taken into account. In addition, participation in seminar classes will be taken into account.

The qualification of each activity, as well as the final, will be numerical from 0 to 10 depending on current legislation.

The mode assigned by default to the student will be continuous assessment. Any student may request the change to the non-continuous assessment modality (before the end of the class period) by sending an email to the teacher, as long as she has not completed 50% of the assessable activities.

To consider the subject as passed, a minimum of 4 points must be obtained in each of the compulsory activities (final tests, attitude in practices, elaboration of the practice report).

In any case, the subject will only be considered passed if the set of all evaluable activities results in a grade of 5 or higher (out of 10).

As it is a continuous evaluation, class attendance and participation in the different scheduled non-compulsory activities (seminars or technical visit to wastewater treatment facilities) are recommended.

The mode assigned by default to the student will be continuous assessment. Any student may request the change to the non-continuous evaluation modality (before the end of the class period) by sending an email to the teacher, provided that they have not completed 50% of the evaluable activities.

Non-continuous evaluation:

In the qualification of the different sections, the level of development of the transversal and specific competences raised above will be taken into account. In addition, participation in seminar classes will be taken into account.

The qualification of each activity, as well as the final, will be numerical from 0 to 10 depending on current legislation.

To consider the subject as passed, a minimum of 4 points must be obtained in each of the compulsory activities (final tests, attitude in practices, elaboration of the practice report).

In any case, the subject will only be considered passed if the set of all evaluable activities results in a grade of 5 or higher (out of 10).

Specifications for the resit/retake exam:

In the case of not reaching 4 points in any of the compulsory activities, the student must take an examination of the activity or activities not passed during the ordinary call. So:

- In the case of the final test, it will be a written exam with the same characteristics.

- In the case of carrying out the practices, a written exam on the content (fundamentals, experimental methods, treatment of results) of the practices.

Specifications for the second resit / retake exam:

In the case of the special call for completion, the activities passed in the last call to which the student took part will be taken into account, carrying out only those that were not passed.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	21.25
Study and Exam Preparation [AUTÓNOMA][Self-study]	38.75
Workshops or seminars [PRESENCIAL][Problem solving and exercises]	12
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	30
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	17.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Practical or hands-on activities]	20
Field work [PRESENCIAL][Case Studies]	4
Mid-term test [PRESENCIAL][Assessment tests]	3
Final test [PRESENCIAL][Assessment tests]	3.5
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	21.25
Study and Exam Preparation [AUTÓNOMA][Self-study]	38.75
Workshops or seminars [PRESENCIAL][Problem solving and exercises]	12
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	30
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	17.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Practical or hands-on activities]	20
Field work [PRESENCIAL][Case Studies]	4
Mid-term test [PRESENCIAL][Assessment tests]	3
Final test [PRESENCIAL][Assessment tests]	3.5
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Leo M.L. Nollet, Leen S. P. De Gelder	Water Analysis	CRC Press		139781439889640	2013	
APHA	Métodos normalizados para el análisis de aguas potables y residuales	Díaz de Santos			1992	
Degremon	Manual Técnico del Agua	Grafo			1979	
Henry, J. G. y Heinke, G. W.	Ingeniería Ambiental	Prentice Hall			1999	
Metcalf y Eddy	Ingeniería de aguas residuales	McGraw-Hill		0070418780, 97800704	2003	
Orozco, C., Pérez, A., González, M. N., Rodríguez, F. J. y Alfayate, J. M.	Contaminación ambiental: Una visión desde la Química	Thomsom Editores Spain			2004	
Ramalho, R. S.	Tratamiento de aguas residuales	Reverté			1991	