



1. General information

Course: INTEGRAL MANAGEMENT OF WASTES AND EMISSIONS IN THE INDUSTRY

Code: 310744

Type: CORE COURSE

ECTS credits: 6

Degree: 2336 - MASTER DEGREE PROGRAM IN CHEMICAL ENGINEERING

Academic year: 2023-24

Center: 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY

Group(s): 20

Year: 1

Duration: First semester

Main language: Spanish

Second language: English

Use of additional languages:

English Friendly: Y

Web site:

Bilingual: N

Lecturer: CARMEN MARIA FERNANDEZ MARCHANTE - Group(s): 20

Building/Office	Department	Phone number	Email	Office hours
Enrique Costa Novella/Despacho 14	INGENIERÍA QUÍMICA	6351	carmenm.fmarchante@uclm.es	Monday, Wednesday and Thursday (12:30-13:30)

Lecturer: MANUEL ANDRES RODRIGO RODRIGO - Group(s): 20

Building/Office	Department	Phone number	Email	Office hours
Enrique Costa. Despacho 01	INGENIERÍA QUÍMICA	3411	manuel.rodrigo@uclm.es	Monday, Wednesday and Friday 9:00-10:00 Please book with UCLM app for a better scheduling

Lecturer: JOSE VILLASEÑOR CAMACHO - Group(s): 20

Building/Office	Department	Phone number	Email	Office hours
ITQUIMA	INGENIERÍA QUÍMICA	6358	jose.villasenor@uclm.es	Monday, Wednesday and Thursday (11:30-13:00)

2. Pre-Requisites

Not established

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

This course aims to cover the need for a professional (Master's level) in Chemical Engineering to apply advanced knowledge in waste management, adequately complementing the previous technical knowledge acquired during the Degree in Chemical Engineering (or equivalent) and covering legislative aspects, waste management, environmental impact assessment and environmental management procedures.

4. Degree competences achieved in this course

Course competences

Code	Description
CB07	To be able to apply acquired knowledge and problem-solving skills in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study
CB09	To be able to communicate their findings, and the ultimate knowledge and reasons behind them, to specialist and non-specialist audiences in a clear and unambiguous manner
E02	To design products, processes, systems and services of the chemical industry, as well as the optimization of others already developed, taking as technological base the diverse areas of the chemical engineering, comprehensive of processes and transport phenomena, separation processes and engineering of the chemical, nuclear, electrochemical and biochemical reactions.
E05	To direct and supervise all types of installations, processes, systems and services of the different industrial areas related to chemical engineering.
E06	Design, build and implement methods, processes and facilities for the integrated management of supplies and waste, solid, liquid and gaseous, in industries, with the capacity to evaluate their impacts and risks.
E14	To direct and manage environmental and/or energy activities.
G01	To have adequate knowledge to apply the scientific method and the principles of engineering and economics, to formulate and solve complex problems in processes, equipment, facilities and services, in which matter undergoes changes in its composition, state or energy content, characteristic of the chemical industry and other related sectors including the pharmaceutical, biotechnological, materials, energy, food or environmental sectors.
G02	To conceive, project, calculate and design processes, equipment, industrial facilities and services, in the field of chemical engineering and related industrial sectors, in terms of quality, safety, economy, rational and efficient use of natural resources and environmental conservation.
G04	To conduct appropriate research, undertake design and direct the development of engineering solutions, in new or unfamiliar environments, relating creativity, originality, innovation and technology transfer.
G06	To have the capacity of analysis and synthesis for the continuous progress of products, processes, systems and services using criteria of safety, economic viability, quality and environmental management.
MC1	To have acquired advanced knowledge and demonstrated an understanding of the theoretical and practical aspects and of the working methodology in the field of Chemical Engineering with a depth that reaches the forefront of knowledge
MC2	To be able, through arguments or procedures developed and supported by themselves, to apply their knowledge, understanding and

MC3	problem-solving skills in complex or professional and specialized work environments that require the use of creative or innovative ideas To have the ability to collect and interpret data and information on which to base their conclusions including, where necessary and relevant, reflection on social, scientific or ethical issues in the field of chemical engineering
MC4	To be able to deal with complex situations or those that require the development of new solutions in the academic, work or professional field of study of Chemical Engineering
MC5	To know how to communicate to all types of audiences (specialized or not) in a clear and precise way, knowledge, methodologies, ideas, problems and solutions in the field of the study of Chemical Engineering
MC6	To be able to identify their own training needs in the field of study of Chemical Engineering and work or professional environment and to organize their own learning with a high degree of autonomy in all kinds of contexts (structured or unstructured).

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To know the main technologies for the treatment of solid waste, liquid effluents and gaseous emissions in the industry.

To be able to identify the potential points of emission of liquid, solid, or gaseous waste in an industrial activity, as well as their flows and characteristics.

To be able to carry out environmental audits and assess other basic aspects of environmental management such as environmental risks and responsibility

To be able to establish the environmental impact of such industrial activity, and propose integrated environmental management plans in order to minimize such impact

To have the ability to raise the options to minimize such emissions as much as possible

6. Units / Contents

Unit 1: Waste management: social implications

Unit 2: Generation and characterization of industrial waste

Unit 3: Minimization of industrial waste

Unit 4: Treatment and Valorisation options for industrial waste

Unit 5: Environmental management 1: Environmental Impact

Unit 6: Environmental management 2: Environmental Management Systems and Life Cycle Assessment

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	CB07 CB09 E02 E05 E06 E14 G01 G02 G04 G06 MC1 MC2 MC3 MC4 MC5 MC6	1	25	Y	N	Theoretical exposition
Problem solving and/or case studies [ON-SITE]	Project/Problem Based Learning (PBL)	CB07 CB09 E02 E05 E06 E14 G01 G02 G04 G06 MC1 MC2 MC3 MC4 MC5 MC6	0.6	15	Y	Y	Practical cases
Group tutoring sessions [ON-SITE]	Group tutoring sessions	CB07 CB09 E02 E05 E06 E14 G01 G02 G04 G06 MC1 MC2 MC3 MC4 MC5 MC6	0.2	5	N	-	Discussion and help about theoretical contents and practical cases
Final test [ON-SITE]	Assessment tests	CB07 CB09 E02 E05 E06 E14 G01 G02 G04 G06 MC1 MC2 MC3 MC4 MC5 MC6	0.2	5	Y	Y	Examination
Field work [ON-SITE]	Case Studies	CB07 CB09 E02 E05 E06 E14 G01 G02 G04 G06 MC1 MC2 MC3 MC4 MC5 MC6	0.4	10	Y	Y	Visit to industry and discussion with external professionals
Study and Exam Preparation [OFF-SITE]	Self-study	CB07 CB09 E02 E05 E06 E14 G01 G02 G04 G06 MC1 MC2 MC3 MC4 MC5 MC6	3.6	90	N	-	Self study
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
Final test	55.00%	85.00%	Continuous assessment option: Partial tests. Non-continuous assessment option: Single final test or exam. In both cases, the acquisition of competences and learning results of the training activity are evaluated (Theory and Problems)
			Continuous evaluation option: The resolution of practical cases

Assessment of problem solving and/or case studies	30.00%	0.00%	is mandatory and attendance and completion in the classroom are required. The delivery of cases resolved in class in writing is evaluated. Single final evaluation option: Ordinary final written test related to practical cases.
Practicum and practical activities reports assessment	15.00%	15.00%	Continuous evaluation option: The activity visits to facilities or external centers is mandatory and completion or attendance is required. The delivery of the corresponding written report is evaluated Single final evaluation option: Ordinary final written test related to the competences related to such activity.
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:

Theory and problems in the classroom: Carrying out partial tests

Resolution of problems and cases: always requires the realization and / or assistance on a regular basis. The delivery of the proposed practical cases will be evaluated.

The field work part (visits) requires assistance with use and the elaboration and delivery of the corresponding report will be evaluated.

A 5.00 is required to pass the course.

Non-continuous evaluation:

In the ordinary final exam, the competencies related to the three training activities will be evaluated in writing by means of a final test:

- Theory/problems
- The resolution of problems or cases
- The preparation of internship reports

Specifications for the resit/retake exam:

All activities are recoverable in an extraordinary final test, with the same assessment criteria.

Specifications for the second resit / retake exam:

All activities are recoverable in a final completion test, with the same evaluation criteria.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	25
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	15
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	5
Final test [PRESENCIAL][Assessment tests]	5
Field work [PRESENCIAL][Case Studies]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	25
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	15
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	5
Final test [PRESENCIAL][Assessment tests]	5
Field work [PRESENCIAL][Case Studies]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
	Contaminación e ingeniería ambiental	FICYT		84-923131-5-3 (o.c.)	1999	
	Gestión ambiental de la empresa : legalización, puesta en ma	Universidad Jaume I,		978-84-8021-867-2	2013	
	Gestión sostenible de los residuos peligrosos /	Síntesis,		978-84-9958-889-6	2013	
	Los residuos peligrosos : caracterización, tratamiento y ge	Síntesis		84-7738-703-6	1999	
Agencia del Medio Ambiente	Manual de minimización de residuos y emisiones industriales	Institut Ildefons Cerdà		84-87365-06-X	1992	
Ferrando Sánchez, Miguel	Gestión y minimización de residuos	Fundación Confemetal		978-84-96743-34-2	2007	