

**1. General information****Course:** ENERGY AND ENVIRONMENT**Type:** ELECTIVE**Degree:** 340 - UNDERGRADUATE DEGREE PROGRAMME IN ENVIRONMENTAL SCIENCES**Center:** 501 - FACULTY OF ENVIRONMENTAL SCIENCES AND BIOCHEMISTRY**Year:** 4**Main language:** Spanish**Use of additional languages:** English**Web site:****Code:** 37344**ECTS credits:** 4.5**Academic year:** 2023-24**Group(s):** 40**Duration:** C2**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** ISAAC ASENCIO CEGARRA - Group(s): 40

Building/Office	Department	Phone number	Email	Office hours
ICAM/ 0.29	INGENIERÍA QUÍMICA	926051573	isaac.asencio@uclm.es	Monday and Wednesday. From 10:00 to 13:00, on request by mail

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	tuesday 12:00 to 13:00

2. Pre-Requisites

Not established

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

This subject is part of a Module dedicated to "Environmental Technology", and more specifically, to a subject dedicated to "Environmental Engineering". In this last matter, other subjects taught by the Department of Chemical Engineering will also be added, such as "Basics of Environmental Engineering", "Processes and Technologies for Water Treatment", "Management and Treatment of Industrial Effluents", and "Management and Treatment of Solid Urban and Assimilated Waste".

The common nexus of all these subjects lies in the need for the future Graduate in Environmental Sciences to know the necessary techniques for the prevention and reduction of pollution generated by activities carried out by human beings (energy production, service sector, processing industries, etc.) on natural resources (water, air, soil). In this sense, this course will focus its attention on the different energy sources, describing each one of them and presenting their advantages and disadvantages.

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

Code	Description
E01	Ability to understand and apply basic knowledge.
E02	Capacity for multidisciplinary consideration of an environmental problem
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.
E05	Capacity for qualitative data interpretation
E06	Capacity for quantitative data interpretation
E13	Ability to handle software.
E24	Water resources management, supply and treatment capacity
E27	Know clean technologies and renewable energies.
E28	Energy management and optimization capacity
T01	To know a second foreign language.
T02	To know and apply the Information and Communication Technologies (ICT).
T03	To use a correct oral and written communication.
T04	To know the ethical commitment and professional deontology.

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

Train the student to work as a team.

To enable the student to work and learn autonomously, as well as for personal initiative.

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 enable the student to search for information, its analysis, interpretation, synthesis and transmission.

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: Energy

Unit 2: Oil

Unit 3: Coal

Unit 4: Natural gas

Unit 5: Thermoelectric plants

Unit 6: Hydroelectric power

Unit 7: Nuclear energy

Unit 8: Solar energy

Unit 9: Wind power

Unit 10: Hydroelectric mini plants

Unit 11: Biomass energy

Unit 12: Other energy sources

Unit 13: Energy efficiency

Unit 14: Practices

Unit 14.1 Practice 1

Unit 14.2 Practice 2

Unit 14.3 Practice 3

Unit 14.4 Practice 4

Unit 14.5 Practice 5

Unit 14.6 Practice 6

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	E02	0.84	21	N	-	Participatory master classes
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	E01 E04 E05 E06 E13 E27 E28 T02 T03 T04	0.6	15	Y	Y	Carrying out laboratory practices and treatment of experimental results using Excel spreadsheets. Attendance at practices is considered a MANDATORY and NON-RECOVERABLE activity in order to pass the subject. The evaluation of the same will be recoverable, either in the extraordinary or special call for completion.
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E01 E02 E13 E27 E28 T02 T04	0.12	3	N	-	Troubleshooting and case studies
Project or Topic Presentations [ON-SITE]	Lectures	E02 E13 E27 E28 T02 T03 T04	0.16	4	Y	N	Exhibition of work by students
Progress test [ON-SITE]	Assessment tests	E01 E02 E03 E04 E05 E06 E27 E28 T01 T02 T03 T04	0.02	0.5	Y	N	Two progress tests during the semester
Final test [ON-SITE]	Assessment tests	E01 E02 E03 E04 E05 E06 E27 E28 T01 T02 T03 T04	0.06	1.5	Y	Y	Final test of the subject in the ordinary call
Practicum and practical activities report writing or preparation [OFF-SITE]	Group Work	E01 E04 E05 E06 E13 E27 E28 T02 T03 T04	0.4	10	Y	Y	The delivery of a practice report per group will be mandatory
Writing of reports or projects [OFF-SITE]	Group Work	E01 E02 E04 E05 E06 E13 E24 E27 E28 T01 T02 T03 T04	0.8	20	Y	N	Carrying out work in groups or individually for later presentation in class
Study and Exam Preparation [OFF-SITE]	Self-study	E01 E02 E05 E06 E13 E27 E28 T01 T02 T03 T04	1.5	37.5	N	-	Test preparation, study of theoretical concepts and problem solving
Total:			4.5	112.5			
Total credits of in-class work: 1.8			Total class time hours: 45				
Total credits of out of class work: 2.7			Total hours of out of class work: 67.5				

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	40.00%	65.00%	A final test will be done. No minimum grade is required.
Laboratory sessions	3.00%	3.00%	Direct translation of the corresponding section in Spanish. In case of conflict, the Spanish version is the correct one. The attitude in the laboratory will be qualified, being the minimum grade for passing the practices a 4 in this part.

Practicum and practical activities reports assessment	7.00%	7.00%	A minimum note of 4 will be necessary in the practical memory to be able to pass the laboratory.
Progress Tests	20.00%	0.00%	There will be two progress tests. No minimum grade is required.
Self Evaluation and Co-evaluation	5.00%	0.00%	Co-evaluation of the works. Online activity. No minimum grade is required.
Theoretical papers assessment	25.00%	25.00%	Work done in groups or individually and presented in class. No minimum grade is required.
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:

Direct translation of the corresponding section in Spanish. In case of conflict, the Spanish version is the correct one.

In the qualification of the different sections, the level of development of the transversal and specific competences raised above 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.

In all cases, it will be mandatory to carry out the laboratory practices and the delivery of a report of the work carried out in them. The practical note will consist of a note of attitude in the laboratory (3%) and one corresponding to memory (7%).

The grade for the subject will be calculated taking into account the grade obtained in the final test (40%), in practices (10%), in the two progress tests (10% each), in the completion and presentation of the work (25%) and the co-evaluation of the work of the rest of the students (on-line activity). There is a minimum note in the compulsory activities:

Practices (essential attendance and minimum average grade of 4.0 in attitude and memory of practices).

The subject will only be considered passed if the set of all evaluable activities results in an average grade of 5 or higher (out of 10).

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, provided that they have not completed 50% of the assessable activities.

Non-continuous evaluation:

Direct translation of the corresponding section in Spanish. In case of conflict, the Spanish version is the correct one.

In the qualification of the different sections, the level of development of the transversal and specific competences raised above 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.

In all cases, it will be mandatory to carry out the laboratory practices and the delivery of a report of the work carried out in them. The practical note will consist of a note of attitude in the laboratory (3%) and one corresponding to memory (7%).

The grade for the subject will be calculated taking into account the grade obtained in the final test (65%), in practices (10%) and in the completion and presentation of the work (25%). There is a minimum note in the compulsory activities:

Practices (essential attendance and minimum average grade of 4.0 in attitude and memory of practices).

The subject will only be considered passed if the set of all evaluable activities results in an average grade of 5 or higher (out of 10).

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, provided that they have not completed 50% of the assessable activities.

Specifications for the resit/retake exam:

Direct translation of the corresponding section in Spanish. In case of conflict, the Spanish version is the correct one.

In the extraordinary call there will be an extraordinary final test whose value in the qualification will be 65%.

The grade for the subject will be calculated taking into account the grade obtained in the final test (65%), in practices (10%) and in the completion and presentation of the work (25%). There is a minimum note in the compulsory activities:

Practices (essential attendance and minimum average grade of 4.0 in attitude and memory of practices).

The students who, in the ordinary call, have failed the memory of practices and/or the memory of theoretical work, will be able to carry them out and deliver them again for evaluation.

Students who have not delivered and presented the theoretical work during the ordinary call, may deliver and present it in the extraordinary call.

The subject will only be considered passed if the set of all evaluable activities results in an average grade of 5 or higher (out of 10).

Specifications for the second resit / retake exam:

Direct translation of the corresponding section in Spanish. In case of conflict, the Spanish version is the correct one.

In the special call for completion, an extraordinary final test will be carried out whose value in the qualification will be 65%.

The grade for the subject will be calculated taking into account the grade obtained in the final test (65%), in practices (10%) and in the completion and presentation of the work (25%). There is a minimum note in the compulsory activities:

Practices (essential attendance and minimum average grade of 4.0 in attitude and memory of practices).

The students who, in the ordinary call, have failed the memory of practices and/or the memory of theoretical work, will be able to carry them out and deliver them again for evaluation.

Students who have not delivered and presented the theoretical work during the ordinary call, may deliver it and present it in the special completion call.

The subject will only be considered passed if the set of all evaluable activities results in an average grade of 5 or higher (out of 10).

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Project or Topic Presentations [PRESENCIAL][Lectures]	4
Progress test [PRESENCIAL][Assessment tests]	.5
Final test [PRESENCIAL][Assessment tests]	1.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	10
Writing of reports or projects [AUTÓNOMA][Group Work]	20
Study and Exam Preparation [AUTÓNOMA][Self-study]	37.5
Unit 1 (de 14): Energy	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Unit 2 (de 14): Oil	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Unit 3 (de 14): Coal	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	.5
Unit 4 (de 14): Natural gas	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Unit 5 (de 14): Thermoelectric plants	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Unit 6 (de 14): Hydroelectric power	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Unit 7 (de 14): Nuclear energy	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Unit 8 (de 14): Solar energy	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Unit 9 (de 14): Wind power	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Unit 10 (de 14): Hydroelectric mini plants	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	.5
Unit 11 (de 14): Biomass energy	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Unit 12 (de 14): Other energy sources	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Unit 13 (de 14): Energy efficiency	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Unit 14 (de 14): Practices	
Activities	Hours
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	15
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	21
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	15
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Project or Topic Presentations [PRESENCIAL][Lectures]	4
Progress test [PRESENCIAL][Assessment tests]	0.5
Final test [PRESENCIAL][Assessment tests]	1.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	10
Writing of reports or projects [AUTÓNOMA][Group Work]	20
Study and Exam Preparation [AUTÓNOMA][Self-study]	37.5
Total horas: 112.5	

Author(s)	Title/Link	Publishing house	City	ISBN	Year	Description
Madrid Vicente, Antonio	Guía completa de las energías renovables y fósiles	AMV		978-84-96709-77-5	2012	
Miguel Barrachina Gómez y otros	El libro de la energía	Forum Atómico Español		84-404-7040-1	1992	
Ramírez, J. y Beltrán L.	Centrales eléctricas	CEAC	Barcelona		1995	
Rey Martínez, F. Javier	Bombas de calor y energías renovables en edificios	Thomson-Paraninfo		84-9732-395-5	2005	
Speight, James G.	The chemistry and technology of petroleum	Marcel Dekker	New York	9780203908631	1999	3ª Edición
Williams, J. Richard	Tecnologías y aplicaciones de la energía solar	Bellisio		978-84-96486-58-4	2007	
González Velasco, Jaime	Conservación y acumulación de energía	Editorial Centro de Estudios Ramón Areces, S.A.		978-84-8004-015-0	1991	
Molina Ibáñez, M.; Chicharro Fernández, E.	Fuentes de energía y materias primas	Síntesis		9788477380184	1999	
Agustín Alonso Santos	La Energía nuclear en sus aspectos básicos	Sociedad Nuclear Española			1984	
Castro Gil, Manuel	Energías geotérmica y de origen marino	Progenisa		84-86505-71-2	1997	
Colmenar Santos, Antonio	Biblioteca multimedia de las energías renovables	Promotora General de Estudios		84-86505-78-X	1998	
Fernández Salgado, José María	Guía completa de la biomasa y los biocombustibles	Antonio Madrid Vicente		978-84-96709-62-1	2010	
Fernández Salgado, José María	Guía completa de la energía solar térmica y termoeléctrica	A. Madrid Ediciones S.A.P.T.		978-84-96709-57-7	2010	
Jarabo Friedrich, Francisco	Energías renovables	Publicaciones técnicas S.A.P.T.		84-86913-07-1	2000	
Jarabo Friedrich, Francisco	La energía de la biomasa	Publicaciones Técnicas		84-86913-04-7	1999	