



1. General information

Course: CARBON, OIL AND PETROCHEMICAL TECHNOLOGY

Type: ELECTIVE

Degree: 344 - CHEMICAL ENGINEERING

Center: 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY

Year: 4

Main language: Spanish

Use of additional
languages:

Web site:

Code: 57732

ECTS credits: 6

Academic year: 2023-24

Group(s): 21

Duration: First semester

Second language:

English Friendly: Y

Bilingual: N

Lecturer: **ESTER LÓPEZ FERNÁNDEZ** - Group(s): 21

Building/Office	Department	Phone number	Email	Office hours
	INGENIERÍA QUÍMICA		Ester.LFernandez@uclm.es	Monday to Wednesday from 12:00 to 14:00

Lecturer: **ANGEL PEREZ MARTINEZ** - Group(s): 21

Building/Office	Department	Phone number	Email	Office hours
E. Costa / despacho 13	INGENIERÍA QUÍMICA	3413	angel.perez@uclm.es	Monday to Wednesday from 12:00 to 14:00

Lecturer: **PAULA SANCHEZ PAREDES** - Group(s): 21

Building/Office	Department	Phone number	Email	Office hours
Enrique Costa Novella. Ingeniería Química.Despacho 8.	INGENIERÍA QUÍMICA	3418	paula.sanchez@uclm.es	Monday to Wednesday from 12:00 to 14:00

2. Pre-Requisites

Not established

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

This is an optional subject located in the Chemical Process Engineering and Energy module. One of the main activities of the Chemical Engineer is focused on carrying out tasks related to Process Engineering, in this case, the subject provides the student with the necessary bases to face this activity from the vision of the use of non-renewable energy sources (coal and oil) but which account for the bulk of current use and production. In addition, the use of the products obtained from these sources is addressed to obtain other chemical compounds of indisputable technological interest: plastics, fertilizers, pesticides, pharmaceutical products, etc. The subjects with which it shares a module are closely related to each other.

4. Degree competences achieved in this course

Course competences

Code	Description
E24	Knowledge and / or ability to handle chemical analysis equipment and property characterization, and the basic instruments of a chemical laboratory.
E26	Knowledge about integration of processes and operations
E28	Ability to compare and select between technological alternatives
E32	Ability to manage information sources in chemical engineering. Properly handle the terminology of the profession in Spanish and English in the oral and written records
E39	Knowledge of the main energy and industrial processes related to oil and / or coal.
E44	Capacity to handle process simulators in Chemical Engineering
G01	Ability to write, sign and develop projects in the field of chemical engineering that are intended, according to the knowledge acquired as established in section 5 of order CIN / 351/2009 of February 9, construction, reform, repair, conservation, demolition, manufacture, installation, assembly or operation of: structures, mechanical equipment, energy installations, electrical and electronic installations, industrial facilities and processes and manufacturing and automation processes.
G02	Capacity for the direction, of the activities object of the engineering projects described in the competence G1.
G03	Knowledge in basic and technological subjects, which enables them to learn new methods and theories, and give them versatility to adapt to new situations.
G04	Ability to solve problems with initiative, decision making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Chemical Engineering.
G05	Knowledge for the realization of measurements, calculations, valuations, appraisals, surveys, studies, reports, work plans and other analogous works.
G06	Ability to handle specifications, regulations and mandatory standards.
G11	Knowledge, understanding and ability to apply the necessary legislation in the exercise of the profession of Industrial Technical Engineer
G14	Proper oral and written communication
G16	Management capacity and information planning
G17	Capacity for critical thinking and decision making
G18	Synthesis capacity
G19	Capacity for teamwork

G20	Ability to analyze and solve problems
G21	Ability to learn and work autonomously
G22	Ability to apply theoretical knowledge to practice
G23	Creativity and initiative
G26	Obtaining skills in interpersonal relationships.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To be able to identify the properties of the polymeric materials and the characterization techniques used for it.

To manage simulators (Hysys) that facilitate the understanding of the characterization tests as well as the operation of the main processes and units of physical refining, conversion, etc.

To know the main processes and units that make up a refinery

To know the procedures for obtaining polymeric materials.

To know the raw materials and products of petro-chemical interest and the reactions through which they transform each other.

To know the properties and quality specifications of coal and oil and its derivatives.

6. Units / Contents

Unit 1: Coal: characterization, resources, and industrial uses.

Unit 2: Crude oil properties, composition and evaluation.

Unit 3: Refinery products: especifications and characteristics for energy and non energy uses.

Unit 4: Petroleum refining: separation processes.

Unit 5: Thermal and catalytic cracking.

Unit 6: Processes for the improvement of properties

Unit 7: Finishing processes and product blending.

Unit 8: Refinery flowscheme.

Unit 9: Petrochemistry industry. Introduction.

Unit 10: Methane and alkanes chemistry.

Unit 11: Ethylene chemistry.

Unit 12: Propylene and C4+ olefins chemistry.

Unit 13: Aromatics chemistry.

Unit 14: Polymers Technology. Introduction.

Unit 15: Thermoplastics polymers.

Unit 16: Others polymers.

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	E26 E28 E39 G01 G02 G03 G06 G11 G14 G16 G17 G18 G20 G23	1.5	37.5	N	-	
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	E24 E26 E28 E32 E39 E44 G04 G05 G06 G11 G14 G16 G17 G18 G19 G20 G22 G23 G26	0.3	7.5	Y	N	Laboratory in computer room.
Workshops or seminars [ON-SITE]	Project/Problem Based Learning (PBL)	E24 E26 E28 E32 E39 G01 G02 G03 G04 G05 G06 G11 G14 G16 G17 G18 G19 G20 G21 G22 G23 G26	0.4	10	Y	N	Appropriate realization of problems and proposed cases, assessing the approach, development and final result.
Group tutoring sessions [ON-SITE]	project-based learning	E24 E26 E28 E32 E39 G01 G02 G03 G04 G06 G11 G14 G16 G17 G18 G19 G20 G21 G22 G23 G26	0.1	2.5	Y	N	Class discussion of problems and cases with active participation.
Study and Exam Preparation [OFF-SITE]	Self-study	E24 E26 E28 E32 E39 E44 G01 G02 G03 G04 G05 G06 G11 G14 G16 G17 G18 G19 G20 G21 G22 G23 G26	3.6	90	N	-	Autonomous preparation of the subject by the student.
Final test [ON-SITE]	Assessment tests	E24 E26 E28 E39 G03 G05 G06 G11 G14 G16 G17 G18 G20 G21 G22 G23	0.1	2.5	Y	Y	Theoretical-practical test to evaluate skills of the subject.
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	Non-continuous	Description
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	assessment	evaluation*	
Theoretical papers assessment	15.00%	0.00%	
Assessment of activities done in the computer labs	10.00%	0.00%	
Assessment of problem solving and/or case studies	15.00%	0.00%	
Final test	60.00%	100.00%	
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:

The activities with the indicated % will be evaluated.

Non-continuous evaluation:

Competences will be evaluated in a single test.

Specifications for the resit/retake exam:

Competences will be evaluated in a single test.

Specifications for the second resit / retake exam:

Competences will be evaluated in a single test.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Unit 1 (de 16): Coal: characterization, resources, and industrial uses.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Workshops or seminars [PRESENCIAL][Project/Problem Based Learning (PBL)]	10
Group tutoring sessions [PRESENCIAL][project-based learning]	2.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Final test [PRESENCIAL][Assessment tests]	2.5
Global activity	
Activities	hours
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Workshops or seminars [PRESENCIAL][Project/Problem Based Learning (PBL)]	10
Group tutoring sessions [PRESENCIAL][project-based learning]	2.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Final test [PRESENCIAL][Assessment tests]	2.5
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Billmeyer, Fred W.	Textbook of polymer science	John Wiley & Sons		0-471-03196-8	1984	
Brydson, J.A.	Plastics materials	Butterworth Heinemann		0-7506-1864-7	1996	
Chauvel, A. and Lefebvre, G.	Petrochemical processes: technical and economic characteristics	Technips	Paris	2-7108-0561-8	1989	
Garrido, L.; Ibarra, L. y Marco, C.	Ciencia y tecnología de materiales poliméricos	Instituto de Ciencias y Tecnología de Polímeros (CSIC)	Madrid	84-609-0966-2	2004	
Gary, James H.	Refino de petróleo : tecnología y economía	Reverté		84-291-7904-6	1980	
Hatch, Lewis F.	From hydrocarbons to petrochemicals	Gulf Division Company		0-87201-374-X	1982	
Meyers, R.A.	HANDBOOK of petroleum refining processes	McGraw-Hill	New York	0-07-041763-6	1986	
RAMOS CARPIO, M. A.	Ingeniería de los materiales plásticos	Díaz de Santos	Madrid	84-86251-85-0	1988	
Ramos Carpio, M. A.	Refino de petróleo, gas natural y petroquímica	Fundación Fomento Innovación Industrial	Madrid	84-605-6755-9	1997	
Ullmann's	Encyclopedia of Industrial Chemistry	Wiley-VCH		3-527-30385-5	2003	
Wauquier, J.P.	Separation processes	Technip	Paris	2-7108-0761-0	2000	
	El refino del petróleo : petróleo	Instituto Superior				

