UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: SEPARATION OPERATIONS
Type: CORE COURSE
Degree: 344 - CHEMICAL ENGINEERING
Center: 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY
Year: 3
Main language: Spanish
Use of additional languages:
Web site:

Code: 57718
ECTS credits: 6
Academic year: 2021-22
Group(s): 21 22
Duration: First semester
Second language:
English Friendly: Y
Bilingual: N

Lecturer: **JUAN FRANCISCO RODRIGUEZ ROMERO** - Group(s): **21 22**

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Lecturer: **CRISTINA SAEZ JIMENEZ** - Group(s): **21 22**

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2. Pre-Requisites

Those established in general for the Degree

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

This subject is taught in the third year of the Degree and consists of a single subject that will be taught in the first semester. Its study is fundamental for the Chemical Engineer's training since based on previously acquired knowledge about transport mechanisms of the three extensive properties (matter, energy and momentum) and the basic operations of fluid flow and heat transmission, as well as on the thermodynamics of mixtures and the equilibrium between phases. It allows to approach the study of the different operations of separation by transfer of matter commonly used in chemical processes.

4. Degree competences achieved in this course

Course competences

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
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
E19	Knowledge about material and energy balances, biotechnology, material transfer, separation operations, chemical reaction engineering, reactor design, and recovery and transformation of raw materials and energy resources.
E20	Capacity for analysis, design, simulation and optimization of processes and products.
E21	Capacity for the design and management of applied experimentation procedures, especially for the determination of thermodynamic and transport properties, and modeling of phenomena and systems in the field of chemical engineering, systems with fluid flow, heat transfer, mass transference, kinetics of chemical reactions and reactors.
G01	Capacity for the direction, of the activities object of the engineering projects described in the competence G1.
G02	Knowledge in basic and technological subjects, which enables them to learn new methods and theories, and give them versatility to adapt to new situations.
G03	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.
G10	Knowledge, understanding and ability to apply the necessary legislation in the exercise of the profession of Industrial Technical Engineer
G12	Knowledge of Information and Communication Technologies (ICT).
G16	Capacity for critical thinking and decision making
G17	Synthesis capacity
G20	Ability to learn and work autonomously
G21	Ability to apply theoretical knowledge to practice
G22	Creativity and initiative

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To know the mechanisms of mass transfer.

To be able to develop the different design methods, trying to preserve the whole vision of each one of the unit operations and establishing the similarities and differences existing amongst them.

To know the importance of material transfer operations in chemical engineering.

To be aware of the theoretical basis of the main separation operations controlled by the mass transfer.

To know the main characteristics of the equipment used in the different separation operations controlled by the mass transfer.

6. Units / Contents

Unit 1: Overview of separation processes

Unit 2: Equilibrium processes of binary mixtures

Unit 3: Equilibrium stages

Unit 4: Distillation

Unit 5: Rectificaction

Unit 6: Absorption

Unit 7: Equipment for separation processes

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	CB01 CB02 CB03 CB05 E19 G01 G02 G03 G10 G12 G16 G17 G20 G22	1.8	45	N	-	
Workshops or seminars [ON-SITE]	Project/Problem Based Learning (PBL)	CB01 CB02 CB03 CB04 CB05 E19 E20 E21 G01 G02 G03 G10 G12 G16 G17 G20 G21 G22	0.4	10	Y	N	
Final test [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB05 E19 E20 E21 G01 G02 G03 G10 G12 G17 G20 G21 G22	0.2	5	Y	Y	
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 E19 E20 E21 G01 G02 G03 G10 G12 G16 G17 G20 G21 G22	3.6	90	N	-	
		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	70.00%	100.00%	exam with theoretical and practical questions. Minimum of 4 points (out of 10) in each part, and 5 out of 10 points to pass the test
Assessment of problem solving and/or case studies	30.00%	0.00%	Minimum delivery of 70% of the proposed tasks
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 subject will be approved provided that each of these activities achieves a minimum score of 4.0 / 10 and an average value for all of them higher than 5.0 / 10.

Non-continuous evaluation:

Evaluation criteria not defined

Specifications for the resit/retake exam:

The subject will be passed with an average value higher than 5.0 / 10.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	45
Workshops or seminars [PRESENCIAL][Project/Problem Based Learning (PBL)]	10
Final test [PRESENCIAL][Assessment tests]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90

Global activity	
Activities	**hours**
Workshops or seminars [PRESENCIAL][Project/Problem Based Learning (PBL)]	10
Class Attendance (theory) [PRESENCIAL][Lectures]	45
Final test [PRESENCIAL][Assessment tests]	5
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
Henley, E.J.; Seader, J.D	Operaciones de Separación por Etapas de Equilibrio en Ingeniería Química	Reverté,	Barcelona		1988	
Seader, J.D.; Henley, E.J	Separation process principles	John Wiley & Sons	New York		2006	
Treybal, R.E.	Liquid Extraction (2nd edition)	McGraw-Hill	New York		1963	
Costa, E.; Sotelo, J.L.; Calleja, G.; Ovejero, G.; Lucas, A. de; Aguado, J.; Uguina, M.A	Ingeniería Química. 5. Transferencia de Materia. 1ª parte	Alhambra	Madrid		1988	
Costa, E.; Sotelo, J.L.; Calleja, G.; Ovejero, G.; Lucas, A. de; Aguado, J.; Uguina, M.A	Ingeniería Química. 6. Transferencia de Materia. 2ª parte. Notas de clase, Departamento de Ingeniería Química, Universidad Complutense de Madrid, Madrid	Alhambra	Madrid		1988	
Doherty, M.F.; Malone, M.F	Conceptual Design of Distillation Systems	McGraw-Hill	New York		2001	
Costa, E.; Sotelo, J.L.; Calleja, G.; Ovejero, G.; Lucas, A. de; Aguado, J.; Uguina, M.A	Ingeniería Química. 7. Transferencia de Materia. 3ª parte. notas de clase	Departamento de Ingeniería Química, Universidad Complutense de Madrid	Madrid			
Antonio Marcilla et al.,	INTRODUCCIÓN A LAS OPERACIONES DE SEPARACIÓN.Cálculo por etapas de equilibrio	Publicaciones Universidad de Alicante		84-7908-405-7	1998	
Antonio Marcilla et al.,	INTRODUCCIÓN A LAS OPERACIONES DE SEPARACIÓN. Contacto continuo	Publicaciones Universidad de Alicante		84-7908-440-5	1999	