UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: ADVANCED SEPARATION OPERATIONS
Code: 310742
Type: CORE COURSE
ECTS credits: 6
Degree: 2336 - MASTER DEGREE PROGRAM IN CHEMICAL ENGINEERING
Academic year: 2020-21
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: **JAVIER LLANOS LOPEZ** - Group(s): **20**

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Lecturer: **ANGEL PEREZ MARTINEZ** - Group(s): **20**

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Lecturer: **CRISTINA SAEZ JIMENEZ** - Group(s): **20**

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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
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
CB10	To possess the learning skills to continue studying in a largely self-directed or autonomous manner.
E01	To apply knowledge of mathematics, physics, chemistry, biology and other natural sciences, obtained through study, experience, and practice, with critical reasoning to establish economically viable solutions to technical problems.
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.
E03	To conceptualize engineering models, apply innovative methods in problem solving and appropriate software applications, for the design, simulation, optimization and control of processes and systems.
E05	To direct and supervise all types of installations, processes, systems and services of the different industrial areas related to chemical engineering.
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.
G05	To know how to establish mathematical models and develop them by means of appropriate computing, as a scientific and technological basis for the design of new products, processes, systems and services, and for the optimization of others already developed.
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.
G07	To integrate knowledge and deal with the complexity of making judgments and decisions, based on incomplete or limited information, including reflections on the social and ethical responsibilities of professional practice
G09	To communicate and discuss proposals and conclusions in multilingual forums, specialized and non-specialized, in a clear and unambiguous way
G11	To possess the skills of autonomous learning in order to maintain and improve the competences of chemical engineering that allow the continuous development of the profession
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 problem-solving skills in complex or professional and specialized work environments that require the use of creative or innovative ideas

MC3	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 how to analyse the influence of the most important variables on the operation of the different separation operations

To acquire knowledge of the separation of multi-component mixtures by means of the separation operations most commonly used in the chemical industry

To be able to select, analyze and design different separation operations controlled by mass transfer and heat transmission, which are part of the basic concepts and fundamental principles of Chemical Engineering

To be able to develop design methods based on the approach of the MESH equations

To have the ability to solve complex problems through the use of advanced simulation programs.

To acquire knowledge relating to the safety and supervision of industrial installations in which separation processes are carried out, allowing the complete design of these basic operations

6. Units / Contents

Unit 1:

Unit 2:

Unit 3:

Unit 4:

Unit 5:

Unit 6:

Unit 7:

Unit 8:

Unit 9:

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]	Combination of methods	CB07 CB10 E01 E02 E03 E05 G01 G02 G05 G06 G07 G09 G11 MC1 MC2 MC3 MC4 MC5 MC6	1.4	35	N	-	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CB07 CB10 E01 E02 E03 E05 G01 G02 G05 G06 G07 G09 G11 MC1 MC2 MC3 MC4 MC5 MC6	0.92	23	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	CB07 CB10 E01 E02 E03 E05 G01 G02 G05 G06 G07 G09 G11 MC1 MC2 MC3 MC4 MC5 MC6	3.6	90	N	-	
Final test [ON-SITE]	Assessment tests	CB07 CB10 E01 E02 E03 E05 G01 G02 G05 G06 G07 G09 G11 MC1 MC2 MC3 MC4 MC5 MC6	0.08	2	Y	Y	
		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
Assessment of problem solving and/or case studies	30.00%	0.00%	
Final test	70.00%	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).

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	**hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	35
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	23
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Final test [PRESENCIAL][Assessment tests]	2

Global activity	
Activities	**hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	35
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	23
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Final test [PRESENCIAL][Assessment tests]	2
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Helfferich, F.G.	Ion Exchange	Dover Publications	New York		1995	
Henley, E.J.; Seader, J.D	Operaciones de Separación por Etapas de Equilibrio en Ingeniería Química	Reverté	Barcelona		1988	
Kudela, L.; Sampson, M.J.	Understanding Sublimation Technology,				1986	
McCabe, W.L.; Smith, J.C.; Harriot, P	Unit Operations in Chemical Engineering	McGraw-Hill	New York		2001	
Nyult, J.	Industrial Crystallization from Solutions	Butterworths,	London		1971	
Ruthven, D.M.	Principles of Adsorption and Adsorption Processes	John Wiley & Sons	New York		1984	
Seader, J.D.; Henley, E.J	Separation process principles	John Wiley & Sons,	New York		2006	
Shinskey, F.G.	Sistemas de control de procesos : aplicación, diseño y sintonización,	McGraw-Hill,	México,		1996	