UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: CHEMICAL REACTION ENGINEERING
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: 57719
ECTS credits: 6
Academic year: 2022-23
Group(s): 21 22
Duration: First semester
Second language: English
English Friendly: Y
Bilingual: N

Lecturer: **FERNANDO DORADO FERNANDEZ** - Group(s): **21 22**

Building/Office	Department	Phone number	Email	Office hours
Enrique Costa. Despacho 2	INGENIERÍA QUÍMICA	3516	fernando.dorado@uclm.es	Monday to Thursday 13:00 a 14:00

Lecturer: **ANA RAQUEL DE LA OSA PUEBLA** - Group(s): **21 22**

Building/Office	Department	Phone number	Email	Office hours
Enrique Costa. Despacho 16	INGENIERÍA QUÍMICA	+34926051963	anaraquel.osa@uclm.es	Monday to Thursday 13:00 a 14:00

2. Pre-Requisites

None. However, it is recommended to have passed the subject Applied Chemical Kinetics (2nd year, 2nd semester).

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

Chemical Reaction Engineering is of great importance in Chemical Engineering, as it is totally characteristic of this engineering. It is fundamental for the design of a chemical reactor, which is the heart of a chemical plant. Thus, its study is transcendental for the Chemical Industry. In this way, a Chemical Engineer, as a professional in the Chemical Industry, must know the fundamentals of the chemical reaction engineering and be able to apply them to calculate the different types of reactors used in said industry.

The implementation of this subject in the third year of the Degree in Chemical Engineering assumes that the previous knowledge required in it (Fluid Flow and Applied Chemical Kinetics, among others) have already been developed previously. Part of the theoretical knowledge developed in the subject will be completed through laboratory practices in other subjects such as the Integrated Laboratory I. The concepts and competences acquired by the students in the subject can be applied in other subjects such as Process and Product Engineering and, especially, Projects.

4. Degree competences achieved in this course

Course competences

Code	Description
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.
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.
G05	Ability to handle specifications, regulations and mandatory standards.
G19	Ability to analyze and solve problems
G20	Ability to learn and work autonomously
G22	Creativity and initiative

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To know the different phenomena taking place inside industrial chemical reactors.

To be able to understand the models used in the design of chemical reactors.

To have the skill to design and optimize chemical reactors.

6. Units / Contents

Unit 1: Genaral Concepts
Unit 2: Batch and Semibatch Reactors
Unit 3: Plug Flow Reactors
Unit 4: Perfectly Mixed Flow Reactors
Unit 5: Association of Reactors
Unit 6: Design for Complex Reaction
Unit 7: Non Ideal Flow
Unit 8: Models for Non Ideal Flow Reactors

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	CB02 E19 E20 E21 G01 G02 G03 G05	1.6	40	N	-	
Problem solving and/or case studies [ON-SITE]	Project/Problem Based Learning (PBL)	CB02 E19 E20 E21 G01 G02 G03 G05 G20 G22	0.6	15	Y	N	
Group tutoring sessions [ON-SITE]	Workshops and Seminars	CB02 G19 G20 G22	0.1	2.5	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	CB02 E19 E20 E21 G01 G02 G03 G05 G19 G20 G22	3.6	90	N	-	
Final test [ON-SITE]	Assessment tests	CB02 E19 E20 E21 G01 G02 G03 G05 G19 G20 G22	0.1	2.5	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
Progress Tests	40.00%	40.00%	
Final test	60.00%	60.00%	
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:

Final exam minimum mark to pass: 4,0
Mínimum global mark to pass: 5,0

Non-continuous evaluation:

Exam with three parts:
Problems: 70% (minimum mark: 4.0)
Theory: 15% (minimum mark: 4.0)
Oral Discussion: 15% (minimum mark: 4.0)
Minimum global mark to pass: 5,0

Specifications for the resit/retake exam:

Same as for regular final exam

Specifications for the second resit / retake exam:

Same as non-continuous evaluation

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	**hours**

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Fogler, H. Scott	Elementos de ingeniería de las reacciones químicas	Pearson Education		970-26-0079-0	2001	
Froment, Gilbert F.	Chemical reactor analysis and design	John Wiley		0-471-52190-6	1990	
Levenspiel, Octave	El omnilibro de los reactores químicos	Reverté		84-291-7336-6	2002	

Levenspiel, Octave	Ingenieria de las reacciones quimicas	Reverté	84-291-7325-0	2005
Santamaría, J.M.	Ingeniería de reactores	Síntesis	84-7738-665-X	2002
Smith, Joe M.	Ingeniería de la cinética química	Compañía Editorial Continental	968-26-0628-4	1986