



# UNIVERSIDAD DE CASTILLA - LA MANCHA

## GUÍA DOCENTE

### 1. General information

**Course:** INTEGRATED LABORATORY OF UNIT OPERATIONS AND CHEMI  
**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:** 57723  
**ECTS credits:** 6  
**Academic year:** 2023-24  
**Group(s):** 21  
**Duration:** C2  
**Second language:**  
**English Friendly:** Y  
**Bilingual:** N

Lecturer: <b>FERNANDO DORADO FERNANDEZ</b> - Group(s): 21				
Building/Office	Department	Phone number	Email	Office hours
Enrique Costa. Despacho 2	INGENIERÍA QUÍMICA	3516	fernando.dorado@uclm.es	M-Th from 13 to 14 h.
Lecturer: <b>IGNACIO GRACIA FERNANDEZ</b> - Group(s): 21				
Building/Office	Department	Phone number	Email	Office hours
Enrique Costa Novella	INGENIERÍA QUÍMICA	3419	ignacio.gracia@uclm.es	M-Th from 13 to 14 h.
Lecturer: <b>RAFAEL GRANADOS FERNÁNDEZ</b> - Group(s): 21				
Building/Office	Department	Phone number	Email	Office hours
E. Costa / Laboratorio de Ingeniería Electroquímica	INGENIERÍA QUÍMICA		Rafael.Granados@uclm.es	M-Th from 13 to 14 h.
Lecturer: <b>ANGEL PEREZ MARTINEZ</b> - Group(s): 21				
Building/Office	Department	Phone number	Email	Office hours
E. Costa / despacho 13	INGENIERÍA QUÍMICA	3413	angel.perez@uclm.es	M-Th from 13 to 14 h.
Lecturer: <b>ALBERTO RODRÍGUEZ GÓMEZ</b> - Group(s): 21				
Building/Office	Department	Phone number	Email	Office hours
	INGENIERÍA QUÍMICA		Alberto.RGomez@uclm.es	

### 2. Pre-Requisites

Mandatory: None.

Recommended: Unit Operations, Fluid Flow, Heat Transfer, and Chemical Reaction Engineering.

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

This subject is the first of the two in which the subject Experimentation in Chemical Engineering has been splitted. It is fundamental as, due to its practical nature, the students have the opportunity to apply the theoretical knowledge previously acquired in other subjects, as well as integrate and use them together. Likewise, they acquire skill in handling equipment characteristic of the profession.

The implementation of this subject in the third year of the Degree in Chemical Engineering assumes that the previous theoretical knowledge required in it (fundamentally Energy and Mass Balances, Heat Transmission and Fluid Flow) have already been developed previously.

### 4. Degree competences achieved in this course

#### Course competences

Code	Description
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.
E22	Ability to design, manage and operate simulation, control and instrumentation procedures of chemical processes.
E26	Knowledge about integration of processes and operations
E40	Knowledge of the basic norms in matters of occupational health and safety, especially those that are applicable in the Industry and in the Chemical Laboratories
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.
G17	Capacity for critical thinking and decision making
G19	Capacity for teamwork
G22	Ability to apply theoretical knowledge to practice
G24	Leadership
G26	Obtaining skills in interpersonal relationships.

## 5. Objectives or Learning Outcomes

### Course learning outcomes

#### Description

To be able to unify the knowledge acquired about Basic Operations, Fluid mechanics, Heat Transmission, Chemical Reaction Engineering, Separation Operations and Control and Instrumentation of the degree, and to apply them jointly.

To have the ability to handle equipment and facilities characteristic of the chemical industry, both at laboratory scale and pilot plant.

To practice in a practical way the knowledge acquired about Basic Operations, Fluid Flow, Heat Transmission, Chemical Reaction Engineering, Separation and Control and Instrumentation Operations.

## 6. Units / Contents

### Unit 1: Packed bed pressure drop

### Unit 2: Heat transfer by forced convection

### Unit 3: Heat exchanger U calculation

### Unit 4: Numerical and analogical solution of the heat equation

### Unit 5: Non-stationary heat transfer

### Unit 6: Fluid flow

### Unit 7: Design of a plug flow reactor

### Unit 8: Design of a perfectly mixed flow reactor

## 7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Laboratory practice or sessions [ON-SITE]	Guided or supervised work	E19 E20 E21 E22 E26 E40 G01 G02 G03 G17 G19 G22 G24 G26	1.4	35	Y	Y	
Group tutoring sessions [ON-SITE]	Group tutoring sessions	E19 E20 E21 E22 E26 E40 G01 G02 G03 G17 G19 G22 G24 G26	0.95	23.75	Y	Y	
Practicum and practical activities report writing or preparation [OFF- SITE]	Self-study	E19 E20 E21 E22 E26 E40 G01 G02 G03 G17 G19 G22 G24 G26	3.6	90	Y	Y	
Final test [ON-SITE]	Assessment tests	E19 E20 E21 E22 E26 E40 G01 G02 G03 G17 G22	0.05	1.25	Y	Y	
<b>Total:</b>			<b>6</b>	<b>150</b>			
<b>Total credits of in-class work: 2.4</b>			<b>Total class time hours: 60</b>				
<b>Total credits of out of class work: 3.6</b>			<b>Total hours of out of class work: 90</b>				

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
Practicum and practical activities reports assessment	55.00%	55.00%	
Final test	45.00%	45.00%	
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

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 labwork activity is absolutely mandatory to pass the subject.

Minimum mark on the practicum to pass: 4,0

Minimum mark of the final exam to pass: 4,0

Minimum global mark to pass: 5,0

#### Non-continuous evaluation:

The labwork activity is absolutely mandatory to pass the subject.

Minimum mark on the practicum to pass: 4,0

Minimum mark of the final exam to pass: 4,0

Mínimum global mark to pass: 5,0

**Specifications for the resit/retake exam:**

Same as regular final exam

**Specifications for the second resit / retake exam:**

Same as regular final exam

**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	City	ISBN	Year	Description
Costa Novella, E.	Ingeniería química : Conceptos generales	Universidad Complutense		84-400-4085-7	1978	
Costa Novella, E.	Ingeniería química	Alhambra		84-205-0989-2	1983	