

**1. General information****Course:** INTRODUCTION TO CHEMICAL ENGINEERING**Type:** CORE COURSE**Degree:** 344 - CHEMICAL ENGINEERING**Center:** 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY**Year:** 1**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 57703**ECTS credits:** 6**Academic year:** 2022-23**Group(s):** 21**Duration:** First semester**Second language:** English**English Friendly:** Y**Bilingual:** N

| Lecturer: MARIA TERESA GARCIA GONZALEZ - Group(s): 21 | | | | |
|---|--------------------|--------------|-----------------------|--|
| Building/Office | Department | Phone number | Email | Office hours |
| Edificio Enrique Costa / Despacho 14 | INGENIERÍA QUÍMICA | 926052851 | teresa.garcia@uclm.es | Monday, Tuesday, and Friday, from 10:00 a.m to 12:00 a.m |
| 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, Tuesday, and Wednesday, from 12:00 a.m to 13:30 a.m. |

2. Pre-Requisites

Not required

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

The objective of "Introduction to Chemical Engineering" is to give an overview of what constitutes Chemical Engineering, with descriptive and qualitative information of Unit Operations and Chemical Process Industries to understand its fundamentals.

This course provides the students the basic skills to be applied in other courses as Fluid Mechanics, Heat Transfer, Environmental Technology, Separation Processes, Chemical Reaction Engineering, Control and Instrumentation of Chemical Processes, and Mass and Energy Balances

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. |
| E31 | 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 |
| E32 | Knowledge of the fundamentals and techniques of environmental analysis |
| 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. |
| G04 | Knowledge for the realization of measurements, calculations, valuations, appraisals, surveys, studies, reports, work plans and other analogous works. |
| G13 | Proper oral and written communication |
| G14 | ethical commitment and professional ethics |
| G16 | Capacity for critical thinking and decision making |
| G18 | Capacity for teamwork |
| G19 | Ability to analyze and solve problems |
| G20 | Ability to learn and work autonomously |
| G21 | Ability to apply theoretical knowledge to practice |
| G22 | Creativity and initiative |
| G26 | Obtaining skills in interpersonal relationships. |

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

To know the methodology to economically evaluate a chemical-industrial process.

To be able to describe a chemical-industrial process, identifying the operating variables, instrumentation and basic control loops.

To have the ability to handle the sources of information of interest in Chemical Engineering, to prepare reports and to communicate and transmit ideas.

To know qualitatively the concept and types of basic operations.

To know qualitatively the environmental and energy implications of the chemical industry.

To know the origins, evolution and sectors of Chemical Engineering.

To be able to identify the types of chemical reactions and evaluate the operation of the different types of reactors in which they take place.
To have the ability to handle dimensionally homogeneous and heterogeneous equations.

6. Units / Contents

Unit 1: History and Evolution of Chemical Engineering
Unit 2: Unit Operations of Chemical Engineering
Unit 3: Classification of Unit Operation
Unit 4: Magnitudes and Units
Unit 5: Dimensional Analysis and Scale-up in Chemical Engineering
Unit 6: Process Variables
Unit 7: Process Flow Diagram
Unit 8: The Chemical Processes
Unit 9: Technical Documentation and Communication Skills for Chemical Engineers
Unit 10: Introduction to Control and Instrumentation of Chemical Processes
Unit 11: Introduction to Transport Phenomena
Unit 12: Basic economic concepts
Unit 13: Introduction to Mass Transfer Operations
Unit 14: Introduction to Chemical Reaction Engineering
Unit 15: Energy
Unit 16: Introduction to Environmental Technology

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 | E19 E31 E32 G03 G13 G16 G18 | 1.2 | 30 | N | - | |
| Computer room practice [ON-SITE] | Practical or hands-on activities | E32 G13 G14 G19 G20 G22 G26 | 0.25 | 6.25 | Y | N | |
| Workshops or seminars [ON-SITE] | Project/Problem Based Learning (PBL) | E31 E32 G03 G04 G19 G20 G22 G26 | 0.6 | 15 | Y | N | |
| Group tutoring sessions [ON-SITE] | Project/Problem Based Learning (PBL) | E31 E32 G04 G19 G26 | 0.2 | 5 | Y | N | |
| Study and Exam Preparation [OFF-SITE] | Self-study | E19 E31 E32 G03 G04 G13 G14 G16 G18 G19 G20 G21 G22 G26 | 3.6 | 90 | N | - | |
| Final test [ON-SITE] | Assessment tests | E19 E31 E32 G03 G04 G13 G14 G16 G18 G19 G20 G21 G22 G26 | 0.15 | 3.75 | 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 activities done in the computer labs | 10.00% | 10.00% | Elaborate and/or explain orally a small technical report. The bibliographic sources consulted, the writing and structure of the report, the power-point presentation and the oral communication in the defense will be assessed. |
| Assessment of problem solving and/or case studies | 10.00% | 0.00% | Solve adequately the practical situations or cases proposed in tutorials and/or seminars. |
| Final test | 70.00% | 90.00% | Taking two partial tests (continuous assessment) or a final test (non-continuous assessment) |
| Assessment of problem solving and/or case studies | 10.00% | 0.00% | Submit to the teacher the solved problems (4-6) in an autonomous way and within the required deadline. |
| 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:

- Test (70%)
- Active participation in tutorials and seminars (10%)
- Problem solving and case studies (10%)
- Work in the computer classroom (10%)

Non-continuous evaluation:

- All the activities will be evaluated together in the exam except the work in the computer room (10%), which must be done autonomously and handed in to

the teacher in due time and form.

Specifications for the resit/retake exam:

- All the activities will be evaluated together in the exam except the work in the computer room (10%), which must be done autonomously and handed in to the teacher in due time and form.

Specifications for the second resit / retake exam:

- All the activities will be evaluated together in the exam except the work in the computer room (10%), which must be done autonomously and handed in to the teacher in due time and form.

| 9. Assignments, course calendar and important dates | |
|--|-------|
| Not related to the syllabus/contents | |
| Hours | hours |
| Unit 1 (de 16): History and Evolution of Chemical Engineering | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 30 |
| Computer room practice [PRESENCIAL][Practical or hands-on activities] | 12.5 |
| Workshops or seminars [PRESENCIAL][Project/Problem Based Learning (PBL)] | 10 |
| Group tutoring sessions [PRESENCIAL][Project/Problem Based Learning (PBL)] | 5 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 90 |
| Final test [PRESENCIAL][Assessment tests] | 2.5 |
| Global activity | |
| Activities | hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 30 |
| Computer room practice [PRESENCIAL][Practical or hands-on activities] | 12.5 |
| Workshops or seminars [PRESENCIAL][Project/Problem Based Learning (PBL)] | 10 |
| Group tutoring sessions [PRESENCIAL][Project/Problem Based Learning (PBL)] | 5 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 90 |
| Final test [PRESENCIAL][Assessment tests] | 2.5 |
| Total horas: 150 | |

| 10. Bibliography and Sources | | | | | | |
|--|---|-----------------------------------|------|---------------|------|---|
| Author(s) | Title/Link | Publishing house | Citv | ISBN | Year | Description |
| CALLEJA, G; GARCÍA, F; DE LUCAS, A; PRATS, D; RODRÍGUEZ, J.M. | Introducción a la Ingeniería Química | Síntesis | | 9788477386643 | | Libro base para el seguimiento de la asignatura |
| MARTÍNEZ DE LA CUESTA, P.J Y RUS MARTÍNEZ, ELOÍSA | Operaciones de Separación en Ingeniería Química. Métodos de Cálculo | Pearson Educación (Prentice Hall) | | | 2004 | |
| COSTA, E.; SOTELO, J.L.; CALLEJA, G., OVEJERO, G.; DE LUCAS, A.; AGUADO, J. Y UGUINA, M.A. | Ingeniería Química 1. Conceptos generales | Alhambra | | | 1983 | |
| COULSON, J.M.; RICHARDSON, J.F.; SINNOTT, R.K.; BACKHURST, J.R.; HARKER, J.H.; PEACOK | Ingeniería Química Tomos I y II | Reverté | | | 1987 | |
| PERRY, R.H. ; GREEN, D.W. | Perry's Chemical Engineer's Handbook. | Mc Graw Hill | | | 1999 | |
| VIAN ORTUÑO, A | El pronóstico económico en química industrial | Eudema, S.A | | | 1991 | |
| VIAN ORTUÑO, A. | Introducción a la química industrial | Reverté | | | 1999 | |