

29928 - Experimentation in Chemical Engineering I

Syllabus Information

Academic year: 2023/24

Subject: 29928 - Experimentation in Chemical Engineering I

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 435 - Bachelor's Degree in Chemical Engineering

ECTS: 6.0

Year: 3

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

The subject complements the training in Chemical Engineering, since, to the theoretical knowledge acquired in the third term subjects, it adds the knowledge and skills acquired in the laboratory in all its facets, enabling the student to develop simple experimental activities typical of the Chemical Engineering profession.

These approaches and goals are aligned with some of the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), specifically, the learning activities planned in this subject will contribute to the achievement of the goals: 6.3 (Goal 6), 9.4 and 9.5 (Goal 9), 12.4 and 12.5 (Goal 12) and 13.3 (Goal 13).

It is recommended to be taking or to have taken the subjects of the third term.

2. Learning results

- Master the resolution of problems related to the design and optimization of equipment in the Chemical Industry.
- Obtain, interpret and apply kinetic information about homogeneous and heterogeneous reactions.
- Analyze and interpret the results obtained in the operation of separation processes.

3. Syllabus

Chemical Engineering

1. Kinetics of a catalyzed homogeneous reaction
2. Kinetics of a homogeneous non-catalytic reaction
3. Kinetics of an enzymatic reaction
4. Absorption with chemical reaction
5. Determination of the equilibrium curve and differential distillation
6. Ion exchange
7. Perfect Mixing and Piston Flow Reactors
8. Leaching
9. Fixed and fluidized bed
10. Reflux distillation
11. Battery of perfect mix tanks in series
12. Adsorption isotherm
13. Gas permeation through porous membranes

Thermal Engines and Motors

1. Energy efficiency of a boiler
2. Assessment of the performance of an evaporative cooler
3. Experimental obtaining of convective heat transfer correlations
4. Reciprocating internal combustion engines and thermal turbomachines

Fluid Mechanics

1. Exploded view and pump selection
2. Pumping installation and pump testing. Cavitation

3. Pressure losses in installations. Valve testing
4. Fan testing

4. Academic activities

Master class (1 h): Presentation of theoretical concepts of the "Fixed and fluidized bed" practice

Laboratory practices (59 h) taught by three different areas as follows:

- Chemical Engineering Area: 13 sessions of 3 hours each.
- Thermal Engines and Machines Area: 4 sessions of 2.5 hours each.
- Fluid Mechanics Area: 4 sessions of 2.5 hours each.

Supervised work (70 h): Preparation of reports corresponding to the practices carried out

Personal study (16 h)

Assessment tests (4 h)

Attendance to the laboratory sessions scheduled during the academic year will be mandatory, as well as the delivery of the practical reports

5. Assessment system

In this subject, an exceptional system of continuous assessment is considered, in accordance with Art 9. Point 4) of the assessment regulations of the University of Zaragoza. This system allows the student to obtain 100% of the grade of the subject in the first call, from which the global assessment test is excluded.

The assessable activities are:

- Laboratory practicals (50% of the grade, minimum 4 out of 10). There will be 21 practices in pairs, assessing the following aspects:
 - Previous preparation of the practice.
 - Development and handling of the material in the laboratory.
 - Questionnaire and/or reports made for each practice.
- Individual written test on the reports submitted (50% of the grade, minimum 4 out of 10)

The final grade will be calculated as follows:

$4/6^* \text{ Grade in Chemical Engineering} + 1/6^* \text{ Grade in Fluid Mechanics} + 1/6^* \text{ Grade in Thermal Machines and Engines}$

A minimum of a 4 out of 10 is required for averaging between the practices of different areas. If a student, in the first call, has a grade lower than 4 in any of the parts that make up the final grade, he/she will be automatically failed even if his/her average grade is a pass, and will be obliged to repeat, in the ordinary test of the second call, the part(s) he/she has failed and the grade of the parts passed will be kept.