Universidad Zaragoza

Academic Year/course: 2020/21

60644 - Equipment for Chemical Processes

Syllabus Information

Academic Year: 2020/21
Subject: 60644 - Equipment for Chemical Processes
Faculty / School: 100 - Facultad de Ciencias
Degree: 540 - Master's in Industrial Chemistry
ECTS: 6.0
Year: 1
Semester: First semester
Subject Type: Compulsory
Module: ---

1. General information

1.1. Aims of the course

1.2. Context and importance of this course in the degree

1.3. Recommendations to take this course

2. Learning goals

2.1. Competences

2.2. Learning goals

2.3. Importance of learning goals

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

This course includes 6 ECTS, 4 ECTS devoted to lectures on theory and examples, and 2 ECTS to the solution of problems given as homework.

The expected 150 hours of work by the students are distributed as follows:

- 40 hours of lectures on theory and problems.
- 20 hours for the explanation and class discussion of the examples previously proposed for homework.
- 85 hours of autonomous work.
- 5 hours of assessment, corresponding to a written final exam.

Lectures will be in the classroom, except if the sanitary situation or the rules given by the academic authorities make necessary to make them on-line.

4.2. Learning tasks

Lectures on theory and problems will be scheduled according to the timetable given by the Faculty of Sciences. Additionally, each professor will inform of their office hours.

4.3. Syllabus

The course will address the following topics:

1. Mass and energy balances: General conservation principles. Macroscopic balances in continuous contact processes with equilibrium stages. Microscopic balances in continuous differential contact. Transport coefficients
2. Chemical Reactors: Homogeneous reactors. Complex Reactions: series, parallel and series-parallel. Reactor optimization. Heterogeneous gas-solid catalytic and non-catalytic. Effectiveness factor and Thiele modulus. Fixed and fluidized bed reactors. Biochemical Reactors.
3. Separation unit operations: Material Separation Agent and Energy Separation Agent. Advantages and disadvantages. Examples. Rectification of binary mixtures. Design of rectification towers by the McCabe-Thiele method. Effectiveness factor. Liquid-Liquid extraction. Fundamentals and calculations methods.
4. Heat transfer equipment: Heat transfer in fluids with and without phase change. Empirical correlations. Shell-tubes heat exchangers. Multiple passes. Single effect and multiple effect evaporators.
5. Flow of fluids: Bernouilli equation. Fluid of non-compressible fluids in tubes. Friction factor and pressure drop. Transport of fluids: tubes, valves, pumps and compressors.
6. Auxiliary services: heating and refrigeration, water, compressed air and electricity.

4.4. Course planning and calendar

This course is given in the first semester (September-February).

The place and timetable for lectures will be established at the beginning of the course and published on the website of the Faculty of Science

http://ciencias.unizar.es/ .

4.5. Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=60644&year=2019