

## 30027 - Industrial Chemical Processes

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 30027 - Industrial Chemical Processes

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 330 - Complementos de formación Máster/Doctorado  
436 - Bachelor's Degree in Industrial Engineering Technology

**ECTS:** 6.0

**Year:** 436 - Bachelor's Degree in Industrial Engineering Technology: 3

330 - Complementos de formación Máster/Doctorado: XX

**Semester:** Second semester

**Subject type:** 436 - Compulsory

330 - ENG/Complementos de Formación

**Module:**

### 1. General information

In this subject, students are expected to identify the basic elements and operations that appear in the chemistry industry. The objective is that the student knows how to perform the material and energy balances of a process that may include a chemical reaction and evaluate the material yields and energy requirements necessary for the process. These approaches and objectives, related to chemical industrial processes, are aligned with some of the Sustainable Development Goals (SDGs) of the 2030 Agenda and certain targets of the same. Specifically, the acquisition of the learning results of the subject will contribute to the achievement of the goals: 6.3, 7.2, 8.4, 9.4, 12.3, 12.4 y 12.5.

### 2. Learning results

1. -Propose alternatives on process equipment to carry out raw material and product conditioning, heat transfer and separation operations.
2. -Solve problems of matter and energy balances applied to industrial chemical processes.
3. -Identify needs for the development of a product in the chemical industry.
4. -Identify the social, environmental, economic and industrial implications of engineering practice associated with a chemical process and propose alternatives and/or solutions.

### 3. Syllabus

Topic 1: Introduction. Most relevant and distinctive characteristics of the Chemical Industry.

Topic 2: Basic knowledge of chemical reactors and separation operations.

Topic 3: Matter and energy balances in chemical processes.

Topic 4: Processes without chemical reaction: Air separation by distillation (cryogenics), adsorption and membranes.

Topic 5: Reactive processes: sulfuric acid production.

Topic 6: Energy production: coal combustion, gasification, biofuels, hydrogen and fuel cells.

Graphene.

Topic 7: Integrated processes: oil refining.

Topic 8: Polymer production processes.

Problems and cases of chemical industrial processes to be solved.

### 4. Academic activities

**Lectures:** 40 hours

The teacher will explain the basic principles of the subject and will solve some selected problems, encouraging student participation.

**Types of problems/cases:** 20 hours

In groups of about 20 students, encouraging autonomous resolution and teamwork with the support of the teacher.

**Academic papers:** 40 hours

Problem solving and group work on a chemical industrial process, solving the balances of matter and energy.

Tutored and personal study: 44 hours

The student will be provided with a collection of problems to solve. For the Work, a follow-up will be made to students.

Assessment tests. 6 hours

## 5. Assessment system

Option 1. Theory exams and problems, and continuous evaluation of the practical case (small group activities or AGP). The PGAs include compulsory attendance to the problem/case sessions, submission of homework and completion of a final paper in a team (3/4 students). A class note may be included in this part. The work will involve 2 meetings with the teacher. In the last one, the oral presentation of the work will take place. It will include environmental aspects, toxicity and safety. Session and class grades will constitute 40% of the practical grade. The Work will constitute the remaining 60%.

Option 2. Single exam. The student will take a written exam with three parts: theory, problems and practical case. The theory part will consist of short questions. The part of problems of matter and energy balance problems. The practical case will correspond to the contents of the PGAs.

In both options, the theory part represents 35% of the final grade, the problems part another 35%, while the practical case represents the remaining 30%.

PGA grades are kept for the duration of the academic year. Nothing is kept from previous academic years. In each part (theory, problems, practical case) a minimum grade of 4/10 is required to average with the rest.