

**Process and Product Engineering**

Code: 102435  
ECTS Credits: 6

Degree	Type	Year	Semester
2500897 Chemical Engineering	OB	3	1
2500897 Chemical Engineering	OB	3	2

## Contact

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## Teaching groups languages

You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

## Prerequisites

To have passed the subject of the first year: Basic Chemical Engineering.

Recommended to have attended to the following subjects:

- Chemical kinetics (2nd year)
- Applied Thermodynamics (2nd year)
- Heat Transmission and Thermotechnics (2nd year)

Recommended to be attending to:

- Separation Operations I (3rd year, 1st term)
- Reactors I (3rd year, 1st term)

## Objectives and Contextualisation

The main objective of the subject is to analyse and evaluate the production processes of the main inorganic and organic products of the different sectors of the chemical industry.

## Competences

## Chemical Engineering

- Apply quality principles and methods.
- Develop personal work habits.
- Develop thinking habits.
- Objectively compare and select different technical options for chemical processes.
- Observe ethics and professionalism.
- Show an understanding of the role of chemical engineering in the prevention and resolution of environmental and energy problems, in accordance with the principles of sustainable development.

## Learning Outcomes

1. Apply chemical engineering to the resolution of energy problems.
2. Contribute to society's welfare and to sustainable development.
3. Describe the different work methodologies in relation to quality management systems.
4. Develop a capacity for analysis, synthesis and prospection.
5. Develop independent learning strategies.
6. Show understanding of the integration of quality management in improved production.
7. Specify the different technical alternatives in the production processes of the main inorganic and organic products in the different sectors of industrial chemistry.

## Content

### ***PART 1: Chemical industry. Generalities***

- Introduction to the chemical industry: origin, development, classification of products.
- Graphical representation of processes. Block diagram. Process diagram.
- Energy and material resources, waste and emissions. Sustainable development. Best available techniques (BAT).
- Quality. Quality management systems. Total quality

### ***PART 2: Overview of some industrial sectors. Processes, operations, equipment and products.***

Refining and petrochemical industry. Biorefineries. The industry of polymers. The industry of sulphur, nitrogen, phosphorus and chlorine. The agrochemical industry (fertilizers and pesticides). Fine chemistry: the pharmaceutical industry. The biotechnology industry, etc.

## Methodology

### ***- Theoretical lessons:***

They include an introduction to the chemical industry, focusing on raw materials, energy, sustainable processes, quality, graphic representation of industrial processes, calculations on mass balances and efficiency, as well as the explanation of processes, equipment and operations in different sectors of the chemical industry. During these lessons, different industrial processes are analysed from a practical point of view, through exercises, information research, comparison among processes and products, etc.

### ***- Completion of a work (in groups)(not compulsory):***

The work consists on the search of information related to some industrial processes or some aspects of these processes by the students as well as sharing this information through an oral presentation and the preparation of written reports.

**- Visits to industrial installations (mandatory assistance):**

Visiting industrial installations of different companies in order to learn on the real implementation of some industrial processes.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

**Activities**

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Theoretical lessons	40	1.6	1, 2, 6, 7
Visits to industrial installations	10	0.4	
Type: Autonomous			
Development of a work in group	26	1.04	1, 2, 6, 4, 7
Own study	55	2.2	1, 2, 6, 7

**Assessment**

**a) Evaluation activities**

The evaluation of the subject is based on the following activities:

- 2 exams.
- Assistance to visits to industrial installations (2 minimum) plus completion of the corresponding questionnaires.
- A work (in groups), non compulsory

Visits to industrial installations are mandatory. Students must attend at least, 2 of the visits that will be scheduled, to pass the subject. In addition, a questionnaire on each visit will be raised at a later date immediately after each visit, which will be announced in advance through Aula Moodle. The mark obtained on the questionnaires contributes to the global mark of the subject in a 10%. The repeating students who attended the visits in previous years do not have to attend again, nor answer the related questions. The mark for this activity will be the one obtained previously.

Work in groups, non compulsory. The work contributes to the global mark of the subject in 20%. It is a collaborative work that requires attendance at some classes. The content of the work and related dates will be announced in a timely manner via Moodle.

Exams. In case of participation in the work in groups, each of the 2 exams contributes 35% to the final grade of the subject, otherwise, each exam contributes with a 45% to the final grade. A minimum mark of 3.5 out of 10 of each exam is required for the calculation of a weighted average with the rest of evaluation items (work and visits' questionnaires).

To pass the subject, at least, a score of 3.5 out of 10 must be obtained in each of the two exams. Also, students must have attended, at least, 2 of the visits that will be scheduled and must have reached a weighted note of all evaluation items of 5 out of 10.

### ***b) Evaluation activities scheduling***

The scheduling of the exams, dates of the visits to the industrial sites and dates related to the work will be published in Aula Moodle. Dates of the exams will also be announced on the Escola d'Enginyeria website.

### ***c) Resit exam***

The resit exam has two parts, each corresponding to one of the two regular exams. The date of the resit exam can be found in the exam calendar of the degree (Escola d'Enginyeria web page). The students should attend the resit exam if, having attended a minimum of 2 visits to industrial sites:

- They got a mark below 3.5 out of 10 on some or all of the regular exams. They should attend to the part of the resit exam corresponding to that exam (or both, if applicable).

- Although having a mark higher than 3.5 out of 10 in the regular exams do not reach 5 out of 10 of the weighted mark of all the evaluation activities. In this case, students should attend to the part of the resit exam corresponding to the regular exam with a mark below 5 out of 10.

A specific resit exam for the questionnaires on industrial sites visits is also planned. Students with an average mark of the questionnaires below 4/10 can attend to this exam as long as they have obtained a minimum average mark of 2/10 of the rest of the evaluation activities.

### ***d) Procedure for evaluation activities' revision***

For each assessment activity, a place, date and time of revision will be indicated in which the student will be able to review the activity with the teacher.

### ***e) Qualifications***

UAB evaluation norm indicate that the Honor Matricules (MH) can only be awarded to students who have obtained a final grade of 9/10 or higher. It can be granted up to 5% of MH of the total number of students enrolled. In this sense, in order to be a candidate for this qualification, in addition to the criteria established by the UAB, a mark equal to or greater than 8.5/10 in each of the assessment activities is required. Students performing the resit exam will not be granted with this qualification.

The qualification of Non-Evaluable (NA) will be given to those students who do not attend any of the regular exams or the resit exam.

Students not achieving the minimum mark in the regular exams and not attending the resit exam, will be qualified with Fail (Suspens) with the numerical mark corresponding to the average of the regular exams.

### ***f) Irregularities by the student, copy and plagiarism***

Without prejudice to other disciplinary measures that are deemed appropriate, and in accordance with the current academic regulations, the irregularities committed by the student that can lead to a variation of the mark in an evaluation activity, will be qualified by a 0 out of 10. Therefore, copying, plagiarizing, cheating, letting copy, etc., in any of the assessment activities, will involve a mark of 0 in that activity. Assessment activities qualified in this way and by this procedure will not be recoverable. If it is necessary to pass any of these assessment activities to pass the subject, the student will fail the subject directly without any opportunity of resitting exam. In this case, the mark will be Suspens (Fail) with a maximum numeric score of 3/10.

All the important dates related to the different activities related to the subject will be published in the Aula Moodle and may be subject to changes in scheduling due to different reasons. Information in Aula Moodle will be continuously updated. Students are encouraged to check this platform with assiduity.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exam 1	35-45%	5	0.2	1, 2, 6, 3, 5, 7
Exam 2	35-45%	5	0.2	1, 2, 5, 7
Questionnaires on the visits to industrial sites	10%	1	0.04	
Work on industrial production processes (non compulsory)	20%	8	0.32	5, 4, 7

## Bibliography

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- A. Vian, Introducción a la Química Industrial, 2a edició, Reverté, 1994.
- P.J. Chenier, Survey of industrial Chemistry, 2<sup>a</sup> edició, VCH Publishers, 1992.
- Kirk-Othmer Encyclopedia of Chemical Technology, John Wiley & Sons, 2004 ([recurs electrònic Biblioteca UAB](#)).
- Turton, R. (et al.), Analysis, synthesis and design of chemical processes, 3rd Ed., Prentice-Hall, Upper Saddle River (NJ, USA), 2009.
- University of York, The Essential Chemical Industry on line: <http://www.essentialchemicalindustry.org>

## Software

No recommended software.