Course guide
330168 - QIN - Chemistry for Industry

Last modified: 28/04/2025

Unit in charge: Manresa School of Engineering
Teaching unit: 750 - EMIT - Department of Mining, Industrial and ICT Engineering.

Degree: BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2016). (Optional subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: MARIA DOLORS GRAU VILALTA

Others: Torra Bitlloch, Immaculada

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Understand and use the principles and their application in process and product engineering, energy technology and chemistry in industry
2. Develop the ability to analyze problem solving.
3. Develop critical reasoning.

Transversal:
4. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.
5. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.
6. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.

TEACHING METHODOLOGY

The subject consists of four hours of class per week, which are dedicated to explaining the theoretical foundations and solving practical exercises.

LEARNING OBJECTIVES OF THE SUBJECT

The objective of the subject is to present the essential basic services in any chemical industry: water and energy, as well as the necessary treatments and especially the saving systems.

The possible risks of industrial facilities will also be analyzed as well as the impact that they may produce, the prevention measures to be taken, ... Finally, all these aspects will be analyzed in some real accidents that have occurred throughout history.

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	30.00
Self study	90,0	60.00
Hours small group	15,0	10.00

Total learning time: 150 h

CONTENTS

Content Title 1: Introduction

Description:
Basic services in the Chemical Industry: Water and energy.

Full-or-part-time: 2h
Theory classes: 2h

Title of content 2: Water in Industry

Description:
The water cycle in industry: supply, production process, purification.
Water problems in industry: sediments, incrustations, corrosion, organisms.
Water treatment in industry: boiler water and cooling circuit water.
Water management in industry: Tariffs, cost incidence, consumption reduction.

Full-or-part-time: 50h
Theory classes: 12h
Practical classes: 6h
Self study : 32h

Content Title 3: Energy in the Chemical Industry

Description:
Energy needs in an industrial chemical process: conventional system, cogeneration system.
Energy saving systems in an industrial chemical process: Types of equipment, saving systems.
Efficient technologies in different equipment: batch reactors, distillation columns, evaporators, membrane systems, combination of equipment.

Full-or-part-time: 23h
Theory classes: 10h
Self study : 13h

Title of content 4: The risk in chemical facilities

Description:
Aspects to take into account when evaluating the risk of a chemical installation, prevention measures and classification of accidents based on their scope and their typology.

Full-or-part-time: 30h
Theory classes: 6h
Laboratory classes: 6h
Self study : 18h

Content title 5: Study of some important chemical accidents

Description:
Description and study of some important chemical accidents produced in the chemical industry or in the transport of dangerous materials over the years. Analysis of its causes and consequences.

Full-or-part-time: 45h
Theory classes: 12h
Laboratory classes: 6h
Self study : 27h

ACTIVITIES

TITLE OF ACTIVITY 1: RESOLUTION OF EXERCISES

Description:
Solving exercises by students individually or in groups. The teacher will guide the resolution.

Specific objectives:
Understanding, applying, analyzing and discussing the theoretical concepts of the related content.

Material:
Compilation of exercises (at the Atenea campus, or occasionally on paper).
Recommended bibliography.
Problems solved by the teacher in class.

Delivery:
Delivery of the problems solved in group.
Evaluation by the teacher or co-evaluation between students (problem section).

Full-or-part-time: 7h
Theory classes: 4h
Self study: 3h

TITLE OF ACTIVITY 2: ATENEA QUESTIONNAIRES

Description:
Questionnaires will be made that students must answer on their own or in class.
The maximum mark obtained will be the one that will be taken into account for the continuous evaluation.

Specific objectives:
Check the follow-up of the subject and the consultation of the available material.

Material:
Material at the Athena campus.
Recommended bibliography.

Delivery:
The questionnaires must be answered within the established period.
Your evaluation will be taken into account in the participation section.

Full-or-part-time: 4h
Self study: 4h

TITLE OF ACTIVITY 3: PRESENTATION OF A CASE STUDY

Description:
Choosing a company to carry out a case study (groups of 2 students).
Oral and written presentation of the results.

Specific objectives:
Understanding, applying, analyzing and discussing the theoretical concepts of the related content.

Material:
Recommended bibliography.
Exercises and contents worked on in class.

Delivery:
The case study must be submitted in writing.
The evaluation will correspond to the exercises section.

Full-or-part-time: 10h
Theory classes: 4h
Self study: 6h

TITLE OF ACTIVITY 4: INDIVIDUAL WRITTEN TEST

Description:
Individual tests in the classroom for the evaluation of theoretical concepts and problem solving, related to the content of the subject.

A) There will be 2 tests of 2 hours each:
- Test 1: Contents 1, 2 and 3
- Test 2: Content: 4 and 5
B) Single test: Contents 1, 2, 3, 4 and 5

Specific objectives:
Understand the theoretical concepts of the related content.

Material:
Statements.
Form made by each student.

Delivery:
Resolution of the evidence and presentation in writing.

Full-or-part-time: 14h
Theory classes: 4h
Self study: 10h

GRADING SYSTEM

A) Continuous evaluation
Exercises, Questionnaire, case study (evaluable activity: 1, 2.3): 40%
Individual tests (evaluable activity 4): 60%

B) Single evaluation
Individual test (evaluable activity 4): 100%

The final grade will be the maximum value obtained in the evaluation according to system A) or B).

In the case of Reassessment, the rating will be obtained by method B) with a maximum of 5.

EXAMINATION RULES.

- Class attendance.
- Delivery of the proposed exercises.
- Delivery of the case study.
- Completion of the Questionnaires
- Carrying out individual tests.

BIBLIOGRAPHY

Basic:
- Martí Deulofeu, J. M. Stenco water treatment = Tratamientos de aguas = Tractaments d'aigües. 5ª ed. Barcelona: Stenco, 2022. ISBN 9788494595769.
- González Fernández, J. A., coord. Teoría y práctica de la lucha contra la corrosión. . Madrid: Consejo Superior de Investigaciones Científicas. Centro Nacional de Investigaciones Metalúrgicas, 1984. ISBN 8400056701.
- Metcalf and Eddy. Ingeniería de aguas residuales: tratamiento, vertido y reutilización. 3ª ed. Madrid: McGraw-Hill, 1995. ISBN 8448116070.

Complementary:
- Manual técnico del agua. 4ª ed. Rueil-Malmaison: Degrémont, 1979. ISBN 8430016511.