1. OVERVIEW

Subject area	Chemistry
Degree	Bachelor's Degree in Industrial Organisation Engineering
School/Faculty	Faculty of Science, Engineering and Design
Year	First
ECTS	6 ECTS
Type	Core
Language(s)	Spanish
Delivery Mode	On campus and online
Semester	Second

2. INTRODUCTION

Chemistry is a basic subject in which students learn about the structure of matter in sufficient detail to be able to study in greater depth its properties in the Materials Science subject area in subsequent years. In Chemistry, students will acquire sufficient knowledge in chemical processes which may affect the composition and structure of materials. In these situations, with these skills as an engineer, they will be able to take the most suitable decisions. They will learn why some materials conduct electricity better than others and measure the chemical processes which lead to corrosion or precipitate formation such as the substances which deposit inside pipes.

3. SKILLS AND LEARNING OUTCOMES

Basic skills (CB, by the acronym in Spanish):

- CB1 - Students have shown their knowledge and understanding of a study area originating from general secondary school education, and are usually at the level where, with the support of more advanced textbooks, they may also demonstrate awareness of the latest developments in their field of study.
- CB4 - Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

Cross-curricular skills (CT, by the acronym in Spanish):

- CT2 - Independent learning: skills for choosing strategies to search, analyse, evaluate and manage
- information from different sources, as well as to independently learn and put into practice what has been learnt.
- CT3 - Teamwork: ability to integrate and collaborate actively with other people, areas and/or organisations to reach common goals.
- CT4 - Written/spoken communication: ability to transmit and gather information, ideas, opinions and attitudes to
- understand and be able to act, spoken through words or gestures or written through words and/or graphic elements.

- CT5 - Analysis and problem-solving: be able to critically assess information, break down complex situations, identify patterns and consider different alternatives, approaches and perspectives in order to find the best solutions and effective negotiations.
- CT6 - Adapting to change: be able to accept, consider and integrate different perspectives, adapting your own approach as required by the situation at hand, and to work effectively in ambiguous situations.

Specific skills (CE, by the acronym in Spanish):

- CE03 - Ability to solve chemistry-related problems in engineering using basic knowledge of the general rules of general, organic and inorganic chemistry.

Learning outcomes (RA, by the acronym in Spanish):

After passing the course the student will be able to:

- RA1 - Effectively solve chemistry-related problems in engineering projects, be they related to organic or inorganic chemistry.

The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes (RA, by the acronym in Spanish)
CB1, CB4, CT2, CT3, CT4, CT5, CT6, CE3	RA1

4. CONTENTS

- Chemical bonds.
- Thermochemistry and chemical kinetics.
- Acid-base balance, precipitate and redox.
- Industrial organic and inorganic chemistry.
- Industrial process.
- Environmental technology.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Master lectures
- Collaborative learning
- Problem-based learning
- Project-based learning
- Learning based on laboratory work (laboratory, workshop and simulation environments)
- Gamification (On Campus)

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On Campus/online:

Learning activity	Number of hours
Master lectures and practical seminars	20
Problem-solving	17
Case studies and field studies	7
Laboratory work	23
Debates and discussions	8
Learning contract (definition of interests, needs and objectives)	2
Autonomous learning	62
Tutorials	9
Knowledge tests	2
TOTAL	**150**

7. ASSESSMENT

The assessment systems, plus their weighting in the final grade for the subject area, are as follows:

On campus:

Assessment system	Weighting
On Campus tests to evaluate objectives of theory/practical learning (exam-type objective tests, written compositions, oral presentations, case studies/problem solving, debates, simulation tests)	50
Off-site tests to assess theory/practical learning (case studies/problem-solving)	30
Attitude assessment tests (attitude assessment rubrics, class participation)	10
Self- and co-assessment (learning contract, learning outcomes)	10

Online:

Assessment system	Weighting
On Campus tests to evaluate objectives of theory/practical learning (exam-type objective tests, written compositions, oral presentations, case studies/problem solving, debates, simulation tests)	60
Off-site tests to assess theory/practical learning (case studies/problem-solving)	30
Self- and co-assessment (learning contract, learning outcomes)	5
Attitude assessment tests (attitude assessment rubrics, class participation)	5

On the Virtual Campus, when you open the subject area, you can see all the details of your assessment activities and the deadlines and assessment procedures for each activity.

8. BIBLIOGRAPHY

The reference publication to accompany this subject area is:

- Química, K.A. Goldsby R. Chang, 12ª ed., Madrid, McGraw-Hill, 2016.

The recommended bibliography is indicated below:

- Chemistry & Chemical Reactivity. 8th ed. John c. Kotz.
- Química y reactividad química. 5ª Edición. John C. Kotz; Paul M. Treichel. Ed. Thomson, 2003.
- Química general: principios y aplicaciones modernas Ralph H. Petrucci, William S. Harwood; Prentice Hall, D.L. 1998.
- Química general Ralph H. PETRUCCI, (11ª ed.): principios y aplicaciones modernas Pearson. 2017
- Formulación y nomenclatura: química inorgánica: [según la normativa IUPAC] / W.R. Peterson, William Roger Barcelona: EDUNSA, 1993.
- Química orgánica / K. Peter C. Vollhardt, Neil E. Schore. Barcelona: Omega, D.L. 1995. 2ª ed.