



Universitat de Lleida

DEGREE CURRICULUM **CHEMISTRY**

Coordination: CASANOVAS SALAS, JORDI

Academic year 2023-24

Subject's general information

Subject name	CHEMISTRY			
Code	102107			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's Degree in Automation and Industrial Electronic Engineering	1	COMMON/CORE	Attendance-based
	Bachelor's Degree in Energy and Sustainability Engineering	1	COMMON/CORE	Attendance-based
	Bachelor's Degree in Mechanical Engineering	1	COMMON/CORE	Attendance-based
	Common branch in industrial engineering programs - Lleida	1	COMMON/CORE	Attendance-based
	Double bachelor's degree: Degree in Mechanical Engineering and Degree in Energy and Sustainability Engineering	1	COMMON/CORE	Attendance-based
	Master's Degree in Industrial Engineering	1	COMPLEMENTARY TRAINING	Attendance-based
	Programa Acadèmic de Recorregut Successiu - Enginyeries Industrials	1	COMMON/CORE	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRAULA		TEORIA
	Number of credits	3		3
	Number of groups	3		3
Coordination	CASANOVAS SALAS, JORDI			
Department	ENVIRONMENT AND SOIL SCIENCES AND CHEMISTRY			

Important information
on data processing

Consult [this link](#) for more information.

Language

Catalan

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
CASANOVAS SALAS, JORDI	jordi.casanovas@udl.cat	10	Arrange an individual appointment with the teacher
GALCERAN NOGUES, JOSE JUAN	josep.galceran@udl.cat	6	Arrange an individual appointment with the teacher
GIL MESTRES, ADRIA	adria.gil@udl.cat	2	

Subject's extra information

- It is advisable continuous work of students throughout the semester, reading basic references and solving exercises. Visit the Virtual Campus frequently, since there will be uploading useful material: backup of the theoretical presentations, collections of exercises, instructions for the practices ... Take advantage of office hours / tutoring with teachers.
- There are not prerequisites for this course.

Learning objectives

The main objective is to review or acquire the basic knowledge of Chemistry that is necessary to ensure the subsequent follow-up of Materials Science.

Specifically:

- Reviewing basic concepts of chemistry (Chapter 1)
- Understanding the internal structure of atoms, its electronic configuration and the information contained in the Periodic Table (Chapter 2)
- Understanding the concept of chemical bonding, predict the types of bond present in any substance Chapter 3)
- In covalent molecules, knowing how to draw Lewis structures and predict their geometry (Chapter 3)
- Understanding basic concepts of crystallography, evaluate magnitudes that characterize structurally the crystals, known of common crystal structures (Chapter 4)
- Interpreting phase equilibrium diagrams (Chapter 5)

Competences

Degree-specific competences

- **EPS1.** Capacity to solve problems and prepare and defence arguments inside the area of studies.

Degree-transversal competences

- **GEEIA4.** Capacity to understand and apply the principles of basic knowledge of general chemistry, organic and inorganic chemistry and their applications in engineering.

Subject contents

1 Introduction to Chemistry

- 1.1 Matter: pure substances and mixtures
- 1.2 Atomic and Molecular Masses
- 1.3 Percentual Composition
- 1.4 Mol concept
- 1.5 Chemical reactions. Stoichiometric calculations
- 1.6 Pure liquids and solutions
- 1.7 Gases

2 Atomic Structure

- 2.1 Atomic Theory
- 2.2 Periodic Table
- 2.3 Periodic Properties

3 Chemical Bonding

- 3.1 The chemical bond
- 3.2 Ionic bond
- 3.3 Covalent bond
- 3.4 Metallic bond
- 3.5 Hydrogen bond and van der Waals forces

4 Structure of crystalline solids

- 4.1 The solid state of matter
- 4.2 Structure of Crystals
- 4.3 Metallic solids
- 4.4 Ionic solids
- 4.5 Covalent solids
- 4.6. Molecular solids

5 Phase equilibria

- 5.1 Definitions. Gibbs rule
- 5.2 Phase diagram for pure substances
- 5.4 Phase diagrams in binary systems
- 5.5 Iron-carbon system

Methodology

- Lectures: introductory concepts and relevant theoretical results illustrated with examples and exercises
- Exercises: We solve exercises of increasing complexity in order to consolidate the concepts developed in the lectures. We propose exercises with real data to show the potential of the tools studied. The exercises are proposed and solved in small groups of students, thus promoting dialogue and participation.
- Other Activities
- In addition, students are responsible for improving their knowledge through autonomous work, on the basis of the material provided or recommended by the teacher.

Development plan

Week	Methodology	Chapter	Classroom hours	autonomous work (hours)
1-4	Lectures and exercises	1	16	24
5-7	Lectures and exercises Laboratory activity	2	12	18
8-10	Lectures and exercises. Laboratory activity	3	12	18
11-13	Lectures and exercises.	4	12	18
14-15	Lectures and exercises. Laboratory activity	5	8	12

Evaluation

Block 1:

- Evaluation Activity 1 (AA1). Written exam, Topics 1-3. Final score percentage: 25%
- Evaluation Activity 2 (AA2). Written exam, Topics 1-5. Final score percentage: 50%

Block 2:

- Laboratory Activities. Final score percentage: 10%

Block 3:

- Multiple choice Tests. Final score percentage: 15%

- Recovery evaluation activity. It allows to recover 75% of the Final score (equivalent to AA1+AA2)

- The possibility of carrying out an Alternative Evaluation is considered. This evaluation would take place on the same day as Evaluation Activity 2. It would consist of 2 parts: written exam similar to AA2 + additional

Bibliography

Basic bibliography:

- P. Atkins y L. Jones, *"Principios de química"*, 3ª Ed., Editorial Medica Panamericana, Buenos Aires, 2006
- R. Petrucci, W.S. Harwood y F.G. Herring, *"Química general"*, 8ª Ed, Pearson Educación, Madrid, 2003
- K.W. Whitten, R.E. Davis y M.L. Peck, *"Química general"*, 5ª Ed., McGraw Hill. Madrid, 1998

Recommended bibliography:

- W.D. Callister y D.G. Rethwisch, *"Ciencia e Ingeniería de los Materiales"*, 2ª Ed., Ed. Reverté S.A., Barcelona, 2016
- J.F. Shackelford, *"Introducción a la Ciencia de Materiales para Ingenieros"*, 7ª Ed., Prentice Hall Iberia, Madrid, 2010
- W.F. Smith y J. Hashemi, *"Fundamentos de la Ciencia e Ingeniería de Materiales"*, 5ª Ed., McGraw-Hill, 2014

Other teaching material can be found in Campus Virtual: <http://cv.udl.cat>