Universitat de Lleida

DEGREE CURRICULUM

CHEMISTRY

Coordination: CASANOVAS SALAS, JORDI

Academic year 2017-18

Subject's general information

Subject name	CHEMISTRY
Code	102107
Semester	1st Q(SEMESTER) CONTINUED EVALUATION
Typology	

Degree	Course	Typology	Modality
Bachelor's Degree in Energy and Sustainability Engineering	1	COMMON	Attendance-based
Bachelor's Degree in Automation and Industrial Electronic Engineering	1	COMMON	Attendance-based
Bachelor's Degree in Mechanical Engineering	1	COMMON	Attendance-based
Master's Degree in Industrial Engineering	1	COMPLEMENTARY TRAINING	Attendance-based

ECTS credits	6
Groups	2GG,4GM
Theoretical credits	4.5
Practical credits	1.5
Coordination	CASANOVAS SALAS, JORDI
Department	QUIMICA
Teaching load distribution between lectures and independent student work	(40%) 60 h lectures (60%) 90 h student work
Important information on data processing	Consult this link for more information.
Language	Catalan
Office and hour of attention	Jordi Casanovas Monday 17-19h / Office 2.14 (EPS) Marià Torrent Monday 15-17h / Office 2.14 (EPS)

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
CASANOVAS SALAS, JORDI	jcasanovas@quimica.udl.cat	10	Monday, 16-18h, office 2.14 EPS
TORRENT MEZCUA, MARIA	torrent@quimica.udl.cat	8	Monday 15-17h, office 2.14, EPS

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.

It is **COMPULSORY** that the students bring the following elements of individual protection (EPI) to the practices at the laboratory.

- Blue laboratory gown from UdL (unisex)
- Protection glasses
- Mechanical protection gloves

They can be purchased through the shop Údels of the UdL:

C/ Jaume II, 67 baixos
Centre the Cultures i Cooperació Transfronterera

http://www.publicacions.udl.cat/

The use of other elements of protection (for example caps, masks, gloves of chemical or electrical risk, etc.) will depend on the type of practice to be done. In that case, the teacher will inform of the necessity of specific EPI.

Not bringing the EPI's described or not fulfilling the norms of general security that are detailed below imply that the student can not access to the laboratories or have to go out of them. The no realisation of the practices for this reason imply the **consequences in the evaluation** of the subject that are described in this course guide.

GENERAL NORMS OF SECURITY IN LABORATORY PRACTICES

- Keep the place of realisation of the practices clean and tidy. The table of work has to be free from backpacks, folders, coats...
- No short trousers or short skirts are allowed in the laboratory.
- Closed and covered footwear is compulsory in the laboratory.
- Long hair needs to be tied.
- Keep the laboratoy gown laced in order to be protected from spills of chemicals.
- Bangles, pendants or wide sleeves are not allowed as they can be trapped.
- Avoid the use of contact lenses, since the effect of the chemical products is much bigger if they enter

between the contact lense and the cornea. Protection over-glasses can be purchased.
- No food or drink is allowed in the laboratory.
- It is forbidden to smoke in the laboratories.
- Wash your hands whenever you have contact with a chemical product and before going out of the laboratory.
- Follow the instructions of the teacher and of the laboratory technicians and ask for any doubt on security.

For further information, you can check the following document of the *Servei de Prevenció de Riscos Laborals de la UdL*: http://www.sprl.udl.cat/alumnes/index.html

Learning objectives

- 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 and chemical reactions
- 1.2 Atomic and Molecular Masses
- 1.3 Composition
- 1.4 Mol concept
- 1.5 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. Intermolecular forces

- 3.1 The chemical bond
- 3.2 Ionic bond
- 3.3 Covalent bond
- 3.4 Metalic 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 Metalic solids
- 4.4 Ionic solids
- 4.5 Covalent solids
- 4.6. Molecular solids

5 Phase equilibria

- 5.1 Definitions
- 5.2 Gibbs rule
- 5.3 Phase diagram for a single component
- 5.4 Phase equilibria in binary systems

5.5 Iron-carbon system

Methodology

The activities will be divided into two parts that complement each other: lectures and exercices.

- Lecture: 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.

In addition, students are responsible for improving their knowledge though 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	2	12	18
8-10	Lectures and exercises. Laboratory activity	3	12	18
11-13	Lectures and exercises. Laboratory activity	4	12	18
14-15	Lectures and exercises. Laboratory activity	5	8	12

Evaluation

- 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%
- Laboratory Activities. Final score percentage: 10%
- Other Activities. Multiple choice Tests. Final score percentage: 15%

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

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. Rethwishch, "*Ciencia e Ingeniería delos Materiales"*, 2ª Ed., Ed. Reverté S.A., Barcelona, 2016
- J.F. Shackelford, "*Introducción a la Ciencia de Materiales paraIngenieros"*, 7ª Ed., Prentice Hall Iberia, Madrid, 2010
- W.F. Smith y J. Hashemi, "*Fundamentos de la Ciencia e Ingeniería deMateriales"*, 5ª Ed., McGraw-Hill, 2014

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