

Academic Year/course: 2021/22

## 29803 - Chemistry

### Syllabus Information

**Academic Year:** 2021/22

**Subject:** 29803 - Chemistry

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

326 - Escuela Universitaria Politécnica de Teruel

**Degree:** 440 - Bachelor's Degree in Electronic and Automatic Engineering

444 - Bachelor's Degree in Electronic and Automatic Engineering

**ECTS:** 6.0

**Year:** 1

**Semester:** 440-First semester o Second semester

107-First semester

444-First semester

**Subject Type:** Basic Education

**Module:**

## 1. General information

## 2. Learning goals

## 3. Assessment (1st and 2nd call)

### 3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

## 4. Methodology, learning tasks, syllabus and resources

### 4.1. Methodological overview

The learning process of this course is based on?

This course is oriented to promote the active learning of the students. The theoretical part is planned as general introductions to each unit and they will be completed with more activities, questions, problems, tutorials, and, at EINA (Zaragoza) and in-person class modality of EUPT (Teruel), with laboratory sessions. In the semi-presencial modality of EUPT (Teruel) the training of the student is completed with the realization of assignments related to different topics of experimentation in the laboratory.

### 4.2. Learning tasks

The program proposed to the students contains the following activities?

**Lectures and problem solving** (5 credits).

Lectures will use both oral exposition and TICs. The students should participate actively on problem solving.

**Laboratory sessions** at EINA (Zaragoza) and in-person class modality of EUPT (Teruel) (1 credit)

The laboratory sessions will be oriented for the student to use the laboratory material and to develop their capacities both deductive and communicative and also teamwork skills. Moreover, the security norms and the correct manipulation of residues will be taken into account.

**In EINA (Zaragoza):**

- **Laboratory session 1:** The study of the physical and chemical properties of several solid compounds based on their chemical structure.
- **Laboratory session 2:** Chemical balance
- **Laboratory session 3:** Electrochemistry. 3.1. Electrolysis of potassium iodide solution. 3.2. Interconversion of energy: solar panel, electrolyser and fuel cell.

#### In in-person class modality of EUPT (Teruel):

- **Laboratory Session 1:** Introductory session. Handling of lab material and equipment. Titration.
- **Laboratory Session 2:** Electrolysis of an aqueous solution (KI)
- **Laboratory Session 3:** Acid-base equilibrium. Complex formation. Hardness of water.

#### Assignments in the semi-presencial modality of the EUPT (Teruel) (1 credit):

The Assignment tasks will be aimed at the student developing deductive, analytical and written communication skills. These tasks will be focused on the resolution and development of case studies related to different laboratory experiences, which will include, among others: acid-base assessments, electrochemistry ...

### 4.3. Syllabus

This course will address the following topics:

- 1. Chemical concepts I:** Fundamental laws. Quantum Model. Quantum atom. Properties of matter. Phases of matter. Stoichiometry of chemical reactions.
- 2. Chemical concepts II:** Electronic structure of atoms. Periodic Table. Periodicity. Bonding: ionic bonding. covalent bonding. Metallic bonding. Bonding theories. Intermolecular bonds. Naming substances. Formulas.
- 3. Chemistry thermodynamics:** Energy of the chemical reactions. Enthalpy. Additivity of the enthalpies. Entropy. Bond energy. Free energy.
- 4. Chemical kinetics.** Reaction rates. Factors affecting reaction rates. Reaction mechanisms.
- 5. Chemical equilibria.** Chemical equilibria law. Chemical equilibria constant. Le Chatelier's Principle. Acid-base equilibrium. Solutions in equilibrium. Heterogeneous equilibria. Factors affecting chemical equilibria.
- 6. Electrochemistry.** Electrolysis. Galvanic cells
- 7. Industrial Organic and Inorganic Chemistry Materials:** Metals. Semiconductors, insulators, ceramic materials, superconductors, polymers, biomaterials, silica panels, liquid crystals, light emission diodes, nanoparticles, carbon nanotubes.

### 4.4. Course planning and calendar

**Lab and class sessions are planned according to the published schedule (see Center website). This schedule is published prior to the beginning of the course in September.**

Each professor will publish his/her tutorials schedule.

The rest of the scheduled activities will be planned according to the number of students.