

## 27201 - Introduction to The Chemistry Laboratory

### Syllabus Information

**Academic Year:** 2020/21

**Subject:** 27201 - Introduction to The Chemistry Laboratory

**Faculty / School:** 100 - Facultad de Ciencias

**Degree:** 452 - Degree in Chemistry

**ECTS:** 9.0

**Year:** 1

**Semester:** Annual

**Subject Type:** Basic Education

**Module:** ---

### 1.General information

#### 1.1.Aims of the course

#### 1.2.Context and importance of this course in the degree

#### 1.3.Recommendations to take this course

### 2.Learning goals

#### 2.1.Competences

#### 2.2.Learning goals

#### 2.3.Importance of 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 methodology followed in this course is oriented towards the achievement of the learning objectives. The subject is practical (7 ECTS). Student learning is based primarily on work in the laboratory that must be accompanied by a previous preparation of the practices. That preparation receives support with some sessions of theory (1 ECTS) and seminars (1 ECTS). In order to guide the learning process, the student must carry out previous questionnaires of each practice that require reviewing and remembering necessary concepts. In addition, after completing the practices, the students must carry out other questionnaires or prepare scripts in which they analyze the data and make the calculations necessary to justify the obtained results and / or observed facts.

Students are expected to participate actively in class throughout the semester.

Further information regarding the course will be provided on the first day of class.

#### 4.2.Learning tasks

The program offered to the student to help them to achieve the expected results includes the following activities:

- Formative Activity 1: Acquisition of basic knowledge of work in the chemical laboratory (1 ECTS). Methodology: Participatory lectures.
- Formative Activity 2: Problem resolution and case study analysis in small group of students (1 ECTS). Methodology: Problem-based learning and questions related to experimentation carried out in the laboratory.
- Formative Activity 3: Study, planning, implementation, documentation and evaluation of laboratory practices (6

ECTS). Methodology: Individual study of the preparatory material, execution of the laboratory practice, elaboration of the practice script, and preparation of the answers to the attached questionnaires.

- Formative Activity 4: Works of experimentation based on applied cases of properties or products chemicals in common use (1 ECTS). Methodology: Presentation of a problem applied with individual tutorials or in small groups followed by the execution of the practice in the laboratory and presentation and discussion of the obtained results.

#### 4.3.Syllabus

The course will address the following learning tasks:

- Topic 1. Safety and basic work in the laboratory
- Topic 2. Solution concentration. Strong and weak electrolytes.
- Topic 3. Solution equilibria. Acid-base indicators. Acid-base reactions.
- Topic 4. Preparation and properties of carbon dioxide. Obtaining of hydrogen and determination of the atomic weight of a metal.
- Topic 5. Oxidants and reductants. Electron transfer reactions.
- Topic 6. Study of the physical properties of some compounds based on types of chemical bonds.
- Topic 7. Heat of neutralization.
- Topic 8. Cryoscopy.
- Topic 9. Reaction kinetics between peroxodisulfate and iodine ions.
- Topic 10. Study of the main properties of the elements in the groups 1, 2 and 17 and identification of their salts.
- Topic 11. Qualitative analysis (I): Identification of  $\text{Cu}^{2+}$ ,  $\text{Cd}^{2+}$  and  $\text{Ni}^{2+}$ .
- Topic 12. Qualitative analysis (II): Identification of  $\text{Ag}^{+}$ ,  $\text{Co}^{2+}$ ,  $\text{Cr}^{3+}$  and  $\text{Zn}^{2+}$ .
- Topic 13. Qualitative analysis (III): Identification of  $\text{Cl}^{-}$ ,  $\text{Br}^{-}$ ,  $\text{SO}_4^{2-}$  and  $\text{PO}_4^{3-}$ .
- Topic 14. Liquid-liquid extraction. Isolation of caffeine from a cola soft-drink. Qualitative study of the a simple vs a multiple extraction.
- Topic 15. Recrystallization. Purification of solid samples.
- Topic 16. Simple distillation. Separation of a mixture of miscible liquids.
- Topic 17. Thin layer chromatography (TLC). Identification of organic compounds by TLC.
- Topics 18-20. Experiments with daily use products.

#### 4.4.Course planning and calendar

ACTIVITY	TOTAL HOURS	
	Teaching hours	Student work
a. Lectures	10 h	25 h
b. Problem solving sessions	10 h	25 h
c. Practice sessions	70 h	81 h
d. Exam	4 h	
<b>Total (225 h)</b>	<b>94 h</b>	<b>131 h</b>

Lectures, practical sessions and examination dates will follow the scheduling fixed by the Science Faculty, which is published in its website (<https://ciencias.unizar.es/calendario-y-horarios>) and in the learning platform Moodle within the *Introducción al Laboratorio Químico* course.

#### 4.5.Bibliography and recommended resources

[http://biblos.unizar.es/br/br\\_citas.php?codigo=27201&year=2019](http://biblos.unizar.es/br/br_citas.php?codigo=27201&year=2019)