

Course guide

390105 - FQ1 - Chemistry I

Last modified: 28/09/2023

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.

Degree: BACHELOR'S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Fernández Altable, Victor Manuel

Others: Bou Torrent, Jordi
Fernandez Altable, Victor Manuel
Lo Gerfo Morganti, Giulia

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Knowledge of the basic concepts of general chemistry, inorganic and organic chemistry, and ability to use them in engineering applications.

TEACHING METHODOLOGY

The directed learning time with a large group consist, first, in lectures where teachers do a brief explanation to introduce learning objectives related to the basic concepts of the subject. Later teacher motivate and engage students to actively participate in their learning through exercises. On the other hand, hours of directed learning in small groups consist of making classes solving problems and numerical exercises or labs. The practices are designed as application of theoretical concepts i let develop basic instrumental skills in a chemical laboratory. In general, before and after each session tasks outside the classroom are proposed, such as resolution of issues and problems that are the basis of learning and self guided.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the Chemistry 1course, the student should be able to:

- Determine the spontaneity of a chemical reaction from the concepts of chemical thermodynamics.
- Explain the meaning of chemical equilibrium and the effect they may exert different variables (concentrations of reactants and products, total pressure and temperature). Relate the equilibrium constant with the standard Gibbs free energy.
- Define and interpret systems of balance in an aqueous solution: acid-base, complexation, and solubility oxidation-reduction and their interrelation.
- Identifying and solving the necessary equations to perform calculations of balance: balance of mass and charge, and equilibrium constants.
- Identify requirements for volumetric analysis, interpreted the valuation curves and make the prior and end calculations.
- Perform correctly basic measures of a chemistry lab.



STUDY LOAD

| Type | Hours | Percentage |
|-------------------|-------|------------|
| Hours small group | 20,0 | 13.33 |
| Hours large group | 40,0 | 26.67 |
| Self study | 90,0 | 60.00 |

Total learning time: 150 h

CONTENTS

BASIC CONCEPTS AND IONIC SOLUTIONS

Description:

- 1.1. Types of chemical compounds and inorganic compounds formulation
- 1.2. Electrolytes strong solutions and calculations of the ionic concentrations

Related activities:

- Activity 1: Class of theoretical explanation.
- Activity 2: Individual final assessment test.
- Activity 3: Laboratory activities.

Full-or-part-time: 28h

Theory classes: 7h

Laboratory classes: 6h

Self study : 15h

THERMODYNAMICS AND CHEMICAL EQUILIBRIUM

Description:

- 3.1. Energy and spontaneity of chemical reactions.
- 3.2. Equilibrium constant.
- 3.3. Modification of the equilibrium conditions
- 3.4 Oxidation reduction reactions

Related activities:

- Activity 1: Class of theoretical explanation
- Activity 2: Individual final assessment test

Full-or-part-time: 46h

Theory classes: 15h

Laboratory classes: 6h

Self study : 25h



BALANCE IN AQUEOUS MEDIUM

Description:

- 4.1 Acid-base reactions
- 4.2 Precipitation and complexation reactions
- 4.3 Equilibrium reactions in aqueous medium
- 4.4. Volumetric analysis

Related activities:

- Activity 1: Class of theoretical explanation.
- Activity 2: Individual final assessment test
- Activity 3: Lab activities.

Full-or-part-time: 61h

Theory classes: 18h

Laboratory classes: 8h

Self study : 35h

ACTIVITIES

(ENG) ACTIVITY 1: THEORY LESSONS

Full-or-part-time: 36h

Theory classes: 36h

(ENG) ACTIVITY 2: INDIVIDUAL TESTS

Full-or-part-time: 4h

Theory classes: 4h

(ENG) ACTIVITY 3: LABORATORY

Full-or-part-time: 50h

Laboratory classes: 20h

Self study: 30h

GRADING SYSTEM

It will be made two individual tests in the classroom: a first test (P1) will include the first half of the subject matter and a second test that will have two modes, the second half test (P2) or final test(F).

The second half test is focused in the second half of the subject matter, though occasionally it may be necessary to use any concept or procedure of the first half. The final test includes all the subject matter . All test also include all the subject matter of practice.

Students, who have obtained a P1 test rating equal or greater than 4, may choose to make second or final test. All other students will have the final test. The final grade for the course, Nfinal, is obtained with one of the following ways:

N1: qualification of the P1 test.

N2: qualification of the second test P2

N3: qualification of the final test

N4: Qualification of small group activities

CG: Qualification of generic competition.

$$N_{\text{final}} = 0.30N1 + 0.45N2 + 0.20N4 + 0.05CG$$

or:

$$N_{\text{final}} = 0.75N3 + 0.20N4 + 0.05CG$$

In the case of failing the course with a final course grade greater than NP, the final test (F) may be re-evaluated.

BIBLIOGRAPHY

Basic:

- Pando García-Pumarino, Concepción; Iza Cabo, Nerea; Petrucci, Ralph H. Química general : principios y aplicaciones modernas [on line]. 10a ed. Madrid [etc.]: Pearson Prentice Hall, 2011 [Consultation: 15/07/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=6751. ISBN 9788483226803.

- Saña Vilaseca, Josep. Química per a les ciències de la naturalesa i de l'alimentació. Barcelona: Vicens Vives, 1993. ISBN 8431632828.