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390105 - FQ1 - Chemistry I

Coordinating unit: 390 - ESAB - Barcelona School of Agricultural Engineering

Teaching unit: 745 - EAB - Department of Agri-Food Engineering and Biotechnology

Academic year: 2019

Degree: BACHELOR ' S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AGRICULTURAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AGRICULTURAL, ENVIRONMENTAL AND LANDSCAPE ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)

ECTS credits: 6 Teaching languages: Catalan

Teaching staff

Coordinator: PATRICIA JIMENEZ DE RIDDER

Others: TERESA BALANYÀ MARTÍ - JOSE SABATE REBOLL - PATRICIA JIMENEZ DE RIDDER - MARIA TERESA COLL AUSIO

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 throught exercices. 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.

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Study load

Total learning time: 150h	Hours large group:	40h	26.67%
	Hours medium group:	0h	0.00%
	Hours small group:	20h	13.33%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

BASIC CONCEPTS AND IONIC SOLUTIONS

Learning time: 28h

Theory classes: 7h
Laboratory classes: 6h
Self study : 15h

Description:

1.1. Types of chemical compounds and inorganic compounds formulation
1.2. Electrolits 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.

THERMODYNAMICS AND CHEMICAL EQUILIBRIUM

Learning time: 46h

Theory classes: 15h
Laboratory classes: 6h
Self study : 25h

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

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BALANCE IN AQUEOUS MEDIUM	Learning time: 61h Theory classes: 18h Laboratory classes: 8h Self study : 35h

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.

Planning of activities

(ENG) ACTIVITY 1: THEORY LESSONS	Hours: 36h Theory classes: 36h

(ENG) ACTIVITY 2: INDIVIDUAL TESTS	Hours: 4h Theory classes: 4h

(ENG) ACTIVITY 3: LABORATORY	Hours: 50h Laboratory classes: 20h Self study: 30h

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Qualification 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.

Nfinal= 0.30N1 + 0.45N2 + 0.20N4 + 0.05CG
or:
Nfinal= 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:

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

Pando García-Pumarino, Concepción; Iza Cabo, Nerea; Petrucci, Ralph H. Química general : principios y aplicaciones modernas. 10a ed. Madrid [etc.]: Pearson Prentice Hall, 2011. ISBN 9788483226803.

Others resources: