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 and to 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 course, 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.
- 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

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 40h</th>
<th>26.67%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group: 20h</td>
<td>13.33%</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Self study: 90h</td>
<td>60.00%</td>
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</table>
# 390105 - FQ1 - Chemistry I

## Content

<table>
<thead>
<tr>
<th>BASIC CONCEPTS AND IONIC SOLUTIONS</th>
<th>Learning time: 28h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 7h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 6h</td>
</tr>
<tr>
<td></td>
<td>Self study: 15h</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>THERMODYNAMICS AND CHEMICAL EQUILIBRIUM</th>
<th>Learning time: 46h</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 15h</td>
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<tr>
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<td>Laboratory classes: 6h</td>
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<tr>
<td></td>
<td>Self study: 25h</td>
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</tbody>
</table>

**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
### 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.

**Learning time:** 61h
- Theory classes: 18h
- Laboratory classes: 8h
- Self study: 35h

### Planning of activities

<table>
<thead>
<tr>
<th>(ENG) ACTIVITY 1: THEORY LESSONS</th>
<th>Hours: 36h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 36h</td>
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<table>
<thead>
<tr>
<th>(ENG) ACTIVITY 2: INDIVIDUAL TESTS</th>
<th>Hours: 4h</th>
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<tbody>
<tr>
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<td>Theory classes: 4h</td>
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<table>
<thead>
<tr>
<th>(ENG) ACTIVITY 3: LABORATORY</th>
<th>Hours: 50h</th>
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<td></td>
<td>Laboratory classes: 20h</td>
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<tr>
<td></td>
<td>Self study: 30h</td>
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</table>
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:

\[
N_{final} = 0.30N_1 + 0.45N_2 + 0.20N_4 + 0.05CG
\]

or:

\[
N_{final} = 0.75N_3 + 0.20N_4 + 0.05CG
\]

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:


Others resources: