220082 - Chemistry I

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 6

Teaching languages: Catalan

Degree competences to which the subject contributes

Specific:
1. An understanding of the basic principles of general, organic and inorganic chemistry and the ability to apply this knowledge in engineering

Transversal:
2. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 1. Analyzing the world’s situation critically and systemically, while taking an interdisciplinary approach to sustainability and adhering to the principles of sustainable human development. Recognizing the social and environmental implications of a particular professional activity.

Teaching methodology

The course is organised in:
i) Large groups: In these classes the theoretical content is developed. The teacher uses an explanatory model to attain the fixed objectives.
ii) Medium size groups: In these classes the theoretical knowledge acquired in the theory classes is applied with exercises and practical examples.
iii) Small groups: In these classes the laboratory practicals corresponding to the subject will be carried out. The student is introduced to the chemistry laboratory and to the experimental methodology. This type of class will be used also for developing supervised activities.

The platform ATENEA will be used as a support for the three types of classes described above. It will be used as a means of communication:
- Teaching staff - student:
  · Information and programming of activities.
  · Learning material.
  · Evaluations.
- Student - teaching staff:
  · Delivery of the activities.
  · Questions, comments and suggestions with respect to the contents of the subject and its learning.
- Student - student - teaching staff:
  · Use of the Forum as a site of information, debate, etc., for matters concerning the development of the learning process.

Learning objectives of the subject
To acquire the necessary chemical knowledge for subsequent studies of Industrial Engineering. At the end of the course the student should be capable of:
- Identifying chemical reactions and carrying out stoichiometric calculations.
- Identifying selected chemical elements and their properties.
- Understanding the different types of chemical bonds.
- Understanding, on the basis of the chemical bonds, the formation of molecules and their properties.
- Relating the structure of molecules with the intermolecular forces and with the properties of matter.
- Describing the states of matter.
- Understanding concepts related with the rate of a chemical reaction.
- Understanding and knowing how to apply the concept of chemical equilibrium, as well as the factors that affect it.
- Identifying the more important organic compounds.
- To apply the theoretical concepts in numerical problems and in the laboratory practicals.
- To acquire the tools necessary for finding relevant information, for selecting it, and for using it in a critical manner.
- To recognise chemistry as an experimental science and to acquire knowledge from its practical application.
- To understand the impact of chemistry in the environment and sustainable development.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 32h</th>
<th>21.33%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 14h</td>
<td>9.33%</td>
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<tr>
<td></td>
<td>Hours small group: 14h</td>
<td>9.33%</td>
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<tr>
<td></td>
<td>Self study: 90h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>


## Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Learning time</th>
<th>Theory classes</th>
<th>Practical classes</th>
<th>Laboratory classes</th>
<th>Self study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTORY CHEMISTRY</td>
<td>44h</td>
<td>6h</td>
<td>3h</td>
<td>7h</td>
<td>28h</td>
</tr>
<tr>
<td>2. THE STRUCTURE OF ATOMS. PERIODIC TABLE OF THE ELEMENTS</td>
<td>20h</td>
<td>4h</td>
<td>1h</td>
<td>3h</td>
<td>12h</td>
</tr>
<tr>
<td>3. CHEMICAL BONDING</td>
<td>15h</td>
<td>5h</td>
<td>1h</td>
<td>9h</td>
<td></td>
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<tr>
<td>4. STATES OF MATTER: GASES, LIQUIDS AND SOLIDS</td>
<td>24h</td>
<td>7h</td>
<td>3h</td>
<td>14h</td>
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<tr>
<td>5. CHEMICAL KINETICS AND CHEMICAL EQUILIBRIUM</td>
<td>40h</td>
<td>7h</td>
<td>6h</td>
<td>4h</td>
<td>23h</td>
</tr>
<tr>
<td>6. ORGANIC CHEMISTRY</td>
<td>7h</td>
<td>3h</td>
<td>4h</td>
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</tbody>
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### Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Theory classes</th>
<th>Self study</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVITY 1. THEORY CLASSES</td>
<td>73h</td>
<td>27h</td>
<td>46h</td>
</tr>
<tr>
<td>ACTIVITY 2. EXERCISE CLASSES</td>
<td>33h</td>
<td>14h</td>
<td>19h</td>
</tr>
<tr>
<td>ACTIVITY 3. CHEMISTRY LABORATORY</td>
<td>34h</td>
<td>14h</td>
<td>20h</td>
</tr>
<tr>
<td>ACTIVITY 4. PARTIAL EXAM</td>
<td>2h</td>
<td>2h</td>
<td></td>
</tr>
<tr>
<td>ACTIVITY 5. FINAL EXAM</td>
<td>2h</td>
<td>2h</td>
<td></td>
</tr>
<tr>
<td>ACTIVITY 6. TEST OF FORMULATION, NOMENCLATURE (ORGANIC CHEMISTRY) AND EQUILIBRIUM REACTIONS</td>
<td>6h</td>
<td>1h</td>
<td>5h</td>
</tr>
</tbody>
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### Qualification system

Global mark: $NG = 0.20 \times N1P + 0.50 \times N2P + 0.20 \times NL + 0.10 \times NA$

Where:
- N1P: corresponds to partial exam mark + additional activity mark.
- N2P: corresponds to final exam mark + additional activity mark.
- NL: corresponds to laboratory practise mark. Activity 3 of this guide.
- NA: corresponds to the mark of the activity 6 of this guide.

The unsatisfactory results of the partial exam (N1P) leads back in the final exam (N2P) for all the students. The global mark, in this case, will be: $NG^* = 0.70 \times N2P + 0.20 \times NL + 0.10 \times NA$

If $NG^*$ is higher than $NG$ it will replace this mark.

### Regulations for carrying out activities

a
Bibliography

Basic:


Others resources:

Hyperlink

http://www.webelements.com

http://www.periodicvideos.com

http://upcommons.upc.edu/video/handle/2099.2/1112