The objective of this subject is to provide an overview of the chemical industry and also about its diversity of products. Therefore, it is essential to visit chemical plants to get acquainted with the production processes that will be explained in class. Special emphasis is made on the safety and environmental aspects related to these processes.

The specific objectives of this subject are:
240656 - Industrial Chemistry

1- Make the student aware of the diversity of products and industries related with the industrial chemistry.
2- Identify the raw materials and intermediate products used in the chemical production at large scale.
3- Understand the different physico-chemical processes that allow the transformation of these raw materials to a final product.
4- Describe relevant processes for the chemical industry.
5- Assess the safety and environmental aspects related to the chemical processes.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
<th>Hours medium group:</th>
<th>45h</th>
<th>40.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study:</td>
<td>67h 30m</td>
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<td>60.00%</td>
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</tbody>
</table>
## Content

### Chapter 1. Introduction to Chemical Industry

**Learning time:** 8h  
Theory classes: 2h  
Practical classes: 2h  
Self study: 4h

**Description:**  
Chemical industry importance at Spanish level and at a global scale. Chemical process definition. Key aspects for its success. Environmental and safety aspects in the chemical industry.

**Related activities:**  
- Lectures (2h)  
- Practical exercises  
- 1 home assignment  
- Practical classes on environmental aspects in the industry (2h)  
- 1 paper to read at home about the chemical engineer studies

**Specific objectives:**  
Objectives 1 and 5.

### Chapter 2. Raw materials used by the chemical industry

**Learning time:** 14h  
Theory classes: 6h  
Self study: 8h

**Description:**  
Main natural sources of raw materials for the chemical industry: litosphere, hydrosphere, atmosphere and biosphere.

**Related activities:**  
- Lectures (2h)  
- Practical exercises  
- Chemical plant visit (4h)

**Specific objectives:**  
Objectives 2 and 5.
## Chapter 3. Petroleum and Petrochemical industry

**Learning time:** 27h 30m  
Theory classes: 11h  
Self study: 16h 30m

**Description:**  

**Related activities:**  
- Lectures (5h)  
- Practical exercises  
- 1 home assignment  
- 2 papers to read at home  
- Chemical Plant Visit (4h)  
- Starting the team project preparation  
- Seminar from an invited speaker (2h)

**Specific objectives:**  
Objectives 3, 4 and 5.

## Chapter 4. Detergents industry

**Learning time:** 15h  
Theory classes: 7h  
Self study: 8h

**Description:**  

**Related activities:**  
- Lectures (3h)  
- Practical exercises  
- 1 home assignment  
- 1 chemical plant visit (4h)  
- Team project development

**Specific objectives:**  
Objectives 2, 3, 4 and 5.
# Chapter 5. Fertilizers industry

**Learning time:** 16h  
Theory classes: 7h  
Self study: 9h

**Description:**  
Fertilizers introduction. Sulphuric acid, Phosphoric acid and Nitric acid production. Environmental and safety aspects.

**Related activities:**  
Lectures (3h)  
Practical exercise  
1 chemical plant visit (4h)  
Team project development

**Specific objectives:**  
Objectives 3, 4 and 5.

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# Chapter 6. Cement industry

**Learning time:** 15h  
Theory classes: 2h  
Practical classes: 2h  
Self study: 11h

**Description:**  

**Related activities:**  
Lectures (2h)  
Practical exercises at class  
1 paper to read at home  
Practical class on safety at the industry (2h)  
Final redaction of the team project report

**Specific objectives:**  
Objectives 2, 3, 4 and 5.
### Chapter 7. Paper industry

<table>
<thead>
<tr>
<th>Learning time: 17h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Self study: 11h</td>
</tr>
</tbody>
</table>

**Description:**
- Introduction to the paper importance at a global scale.
- Different types of paper.
- Manufacturing processes.
- Environmental aspects related to paper production.

**Related activities:**
- Lectures (2h)
- 1 home assignment
- Preparation of the team project presentations
- Team project presentations at class (4h)
- Self study

**Specific objectives:**
- Objectives 2, 3, 4 and 5
### Planning of activities

| LECTURES | Hours: 52h 30m  
| Theory classes: 21h  
| Self study: 31h 30m |
| --- | --- |
| **Description:** | Explain the contents of this subject. |
| **Support materials:** | Slides, exercises and papers. All the material is available on-line (atenea). |
| **Descriptions of the assignments due and their relation to the assessment:** | Home assigments. Mid-term exam and Final exam. |
| **Specific objectives:** | To comply with those set in this subject. |

| VISITS | Hours: 20h  
| Theory classes: 16h  
| Self study: 4h |
| --- | --- |
| **Description:** | The visits to chemical plants will allow the students to have a first-hand view of the chemical processes at a large scale. |
| **Support materials:** | The one provided by the company. |
| **Specific objectives:** | Objectives from 1 to 6. |

| PRACTICAL CLASSES | Hours: 6h  
| Practical classes: 4h  
| Self study: 2h |
| --- | --- |
| **Description:** | There will be two practical classes, one on environmental aspects in the industry and the other on safety aspects. |
| **Support materials:** | Slides on-line (atenea) |
| **Descriptions of the assignments due and their relation to the assessment:** | Final test |
| **Specific objectives:** | Objective 5 |

| TEAM PROJECT | Hours: 34h  
| Theory classes: 4h  
| Self study: 30h |
| --- | --- |
Description:
Each team will focus on a different chemical product used in the every day life. The students will learn its production process from the raw material to the final product. They will explain this to the rest of the class.

Support materials:
Bibliographic research, chemical plant visits, professors inquiries, etc.

Descriptions of the assignments due and their relation to the assessment:
Final report and presentation delivery at the end of the term.

Specific objectives:
The students will face a new challenge: the production of a product that it is unknown. They will have to find the way to understand and explain this process to the rest of the class.

Qualification system
First-term exam: 35% of the final qualification
Second-term exam: 35% of the final qualification
Team project: 20% of the final qualification
Visits report: 10% of the final qualification
Practical classes: 10% of the final qualification

Regulations for carrying out activities
- Each exam is independent. The first-one assesses the topics explained up to mid-term and the final exam, the rest of topics until the end of the course.
- The second term exam will be done the day of the final exam.
- The reevaluation exam will only substitute the qualifications obtained in the mid-term and second-term exams. The final work, the practical classes and the visits reports are not reevaluated. The student have to do at least one evaluation event to obtain a final qualification.
- The visits to chemical plants are not compulsory, but they are another class. Therefore, their content can be asked in the exams.
Bibliography

Basic:


Complementary: