# Course guide
## 205226 - SCIAD - Surface Chemistry for Industrial Applications Design

<table>
<thead>
<tr>
<th>Unit in charge:</th>
<th>Terrassa School of Industrial, Aerospace and Audiovisual Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching unit:</td>
<td>713 - EQ - Department of Chemical Engineering.</td>
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<tr>
<td>Degree:</td>
<td>BACHELOR’S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).</td>
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<td></td>
<td>BACHELOR’S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).</td>
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<td>BACHELOR’S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).</td>
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<td>BACHELOR’S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).</td>
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<td>BACHELOR’S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).</td>
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<td>BACHELOR’S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Optional subject).</td>
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<td>BACHELOR’S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).</td>
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<td>BACHELOR’S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject).</td>
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<td>BACHELOR’S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Optional subject).</td>
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<td>BACHELOR’S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).</td>
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<td>Academic year:</td>
<td>2022</td>
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<td>ECTS Credits:</td>
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<td>Languages:</td>
<td>English</td>
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<tr>
<td>LECTURER</td>
<td></td>
</tr>
<tr>
<td>Coordinating lecturer:</td>
<td>MANUEL-JOSE LIS ARIAS</td>
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<td>Others:</td>
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### PRIOR SKILLS
Multidisciplinary approach of the subject makes that the competences acquired until third curs should be enough. Advanced studies in third curs and totally passed the second course would be recommended. This condition is not a way to exclude students.

### TEACHING METHODOLOGY
Some activities that correspond to the six groups of items in which subject has been divided. After summarized theoretical approach to each group, there will be some real problems to be solved.

### LEARNING OBJECTIVES OF THE SUBJECT
Real industrial systems require, for their modification or for new design of a transversal vision about the phenomena involved in the whole process. The majority of industrial applications involve heterogeneous systems that act just depending on the chemical characteristics of the components in contact.
The main objective of this subject is to define every phenomenology involved in this type of industrial systems.
### STUDY LOAD

<table>
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<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tr>
<td>Hours medium group</td>
<td>8,0</td>
<td>10.67</td>
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<tr>
<td>Self study</td>
<td>45,0</td>
<td>60.00</td>
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<tr>
<td>Hours large group</td>
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<tr>
<td>Hours small group</td>
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**Total learning time:** 75 h

### CONTENTS

#### Interfaces in industrial systems

**Description:**
Chemical characteristics of heterogeneous systems. Electric potential and diffusional layers. Colloidal systems. Amphotheric molecules and surface activity molecules: micelles, mixed micelles, biological membranes
Relationship between chemical structure and properties depending on (viscosity, dipolar moment, ...) Interfacial tension. Couy-Chapman Theory for different interfaces

**Specific objectives:**
To establish the relationship between chemical structure and surface properties

**Related activities:**
Case 1: For a specific system, detect and study the relationship between interfaces

**Full-or-part-time:** 12h 30m
- Theory classes: 1h
- Practical classes: 2h
- Laboratory classes: 2h
- Self study: 7h 30m

#### Gas-liquid

**Description:**
Bubbles. Interfaces generated by the formation of bubbles. Foams. Final density control for foams. Antifoaming agents

**Specific objectives:**
To establish the basic phenomena involved in the contact between bubbles and liquids

**Full-or-part-time:** 12h 30m
- Theory classes: 1h
- Practical classes: 2h
- Laboratory classes: 2h
- Self study: 7h 30m
Non-miscible liquid systems

**Description:**

**Specific objectives:**
To become familiar with two non-miscible liquids and know how to manage to mix them

**Related activities:**
Case 2: For an specific case, to establish and define the methodology to follow to make a disperse system

**Full-or-part-time:** 11h 30m
Theory classes: 4h
Self study: 7h 30m

Non porous solids-liquids

**Description:**

**Specific objectives:**
To define the chemical interactions between non porous solids and liquids

**Full-or-part-time:** 11h 30m
Theory classes: 4h
Self study: 7h 30m

Porous solids-liquids

**Description:**

**Specific objectives:**
To differentiate the behaviour of the solid interface when the solid is porous

**Related activities:**
Case 3: For specific cases, define the strategy to improve the adhesion phenomena

**Full-or-part-time:** 13h 30m
Theory classes: 2h
Practical classes: 2h
Laboratory classes: 2h
Self study: 7h 30m
Gas-solid systems

Description:
Porosity effects on solid-gas systems. Membrane effect. Filtration. Retention capability of gases by membranes, depending on their chemical characteristics.

Specific objectives:
To establish the interactions between solid and gases

Related activities:
Case 4: For an specific system, define and determine the interactions between solid and gas

Full-or-part-time: 13h 30m
Theory classes: 2h
Practical classes: 2h
Laboratory classes: 2h
Self study : 7h 30m

GRADING SYSTEM

Developed that will weigh 25% each. Written delivery and oral presentation

EXAMINATION RULES.

The written report for each case and the oral presentations will be scheduled

BIBLIOGRAPHY

Basic:

RESOURCES

Other resources:
For every case, some articles and specific bibliography will be delivered