### Degree competences to which the subject contributes

#### Transversal:

1. **SELF-DIRECTED LEARNING** - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

#### Teaching methodology

- FACE-TO-FACE EXPOSITORY CLASSES (THEORY)
- FACE-TO-FACER DIRECTED CLASSES (PROBLEM SOLVING)
- COOPERATIVE LEARNING

#### Learning objectives of the subject

Describe the main goals, technological processes and applications of coatings and surface finishing in order to achieve a practical and fundamental understanding of surface engineering.
## Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>45h</th>
<th>30.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours small group:</td>
<td>15h</td>
<td>10.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
# 820085 - ARS - Surface Finishing and Coatings

## Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Learning time</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. INTRODUCTION TO SURFACE ENGINEERING</strong></td>
<td><strong>6h</strong></td>
<td>Purpose of Surface Finishing and Coating Appearance Corrosion Control, Wear and Fatigue</td>
</tr>
<tr>
<td><strong>2. SURFACE CHARACTERIZATION</strong></td>
<td><strong>14h</strong></td>
<td>Morphology, Mechanical and Tribological Properties Microscopy and Spectroscopy Techniques</td>
</tr>
<tr>
<td><strong>3. SURFACE CLEANING</strong></td>
<td><strong>19h</strong></td>
<td>Solvents, Detergents, Acid and Alkaline Products Ultrasounds Sandblasting, Pickled Products</td>
</tr>
</tbody>
</table>
## 4. SURFACE MODIFICATION. CONVENTIONAL TREATMENTS

**Description:**  
THERMAL (QUENCHING)  
MECHANICAL (SHOT PEENING)  
BY DIFUSION (CARBURIZING, NITRIDING)

**Learning time:** 26h  
- Theory classes: 8h  
- Laboratory classes: 3h  
- Self study (distance learning): 5h  
- Self study: 10h

## 5. SURFACE MODIFICATION. ADVANCED TREATMENTS

**Description:**  
THERMAL (INDUCTION HARDENING, LASER HARDENING)  
BY DIFUSION (ION NITRIDING)  
BY SPUTTERING (ION IMPLANTATION)

**Learning time:** 18h  
- Theory classes: 5h  
- Laboratory classes: 2h  
- Self study (distance learning): 5h  
- Self study: 6h

## 6. COATINGS. CONVENTIONAL TECHNIQUES

**Description:**  
ELECTROPLATING (ZINC, CHROMIUM, ANODIZING)  
ELECTROLESS PLATING (NICKEL)  
BY IMMERSION (GALVANIZED)

**Learning time:** 33h  
- Theory classes: 10h  
- Laboratory classes: 3h  
- Self study (distance learning): 5h  
- Self study: 15h
7. COATINGS. ADVANCED TECHNIQUES

Learning time: 19h
- Theory classes: 5h
- Laboratory classes: 2h
- Self study (distance learning): 5h
- Self study: 7h

Description:
- THERMAL SPRAYING
- PVD
- CVD

8. ORGANIC COATINGS

Learning time: 15h
- Theory classes: 4h
- Laboratory classes: 1h
- Self study (distance learning): 5h
- Self study: 5h

Description:
- PAINTINGS
- ENAMELS

Qualification system

FIRST PARTIAL EXAM: 10%
SECOND PARTIAL EXAM: 20%
THIRD PARTIAL EXAM: 40%
SELF-DIRECTED LEARNIG (GENERIC SKILL): 20%
LABORATORY: 10%

Bibliography

Basic:


