820085 - ARS - Surface Finishing and Coatings

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 702 - CMEM - Department of Materials Science and Metallurgy
Academic year: 2016
Degree: BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: Catalan

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.

Requirements
THE STUDENTS MUST HAVE COMPLETED COURSES OF MATERIALS SCIENCE AND TECHNOLOGY AND BASIC CHEMISTRY

Degree competences to which the subject contributes

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: 45h 30.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours small group: 15h 10.00%</td>
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<tr>
<td></td>
<td>Self study: 90h 60.00%</td>
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</tbody>
</table>
# Content

## 1. INTRODUCTION TO SURFACE ENGINEERING

**Learning time:** 6h  
Theory classes: 3h  
Laboratory classes: 0h  
Self study (distance learning): 0h  
Self study: 3h

**Description:**  
PURPOSE OF SURFACE FINISHING AND COATING  
APPEARANCE  
CORROSION CONTROL, WEAR AND FATIGUE

## 2. SURFACE CHARACTERIZATION

**Learning time:** 14h  
Theory classes: 5h  
Laboratory classes: 2h  
Self study (distance learning): 0h  
Self study: 7h

**Description:**  
MORPHOLOGY, MECHANICAL AND TRIBOLOGICAL PROPERTIES  
MICROSCOPY AND SPECTROSCOPY TECHNIQUES

## 3. SURFACE CLEANING

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

**Description:**  
SOLVENTS, DETERGENTS, ACID AND ALKALINE PRODUCTS  
ULTRASOUNDS  
SANDBLASTING, PICKLED PRODUCTS
### 4. SURFACE MODIFICATION. CONVENTIONAL TREATMENTS

**Description:**
- THERMAL (QUENCHING)
- MECHANICAL (SHOT PEENING)
- BY DIFFUSION (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 DIFFUSION (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

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 19h</th>
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<tbody>
<tr>
<td>THERMAL SPRAYING</td>
<td>Theory classes: 5h</td>
</tr>
<tr>
<td>PVD</td>
<td>Laboratory classes: 2h</td>
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<tr>
<td>CVD</td>
<td>Self study (distance learning): 5h</td>
</tr>
<tr>
<td></td>
<td>Self study: 7h</td>
</tr>
</tbody>
</table>

# 8. ORGANIC COATINGS

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 15h</th>
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</thead>
<tbody>
<tr>
<td>PAINTINGS</td>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td>ENAMELS</td>
<td>Laboratory classes: 1h</td>
</tr>
<tr>
<td></td>
<td>Self study (distance learning): 5h</td>
</tr>
<tr>
<td></td>
<td>Self study: 5h</td>
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## Qualification system

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

## Bibliography

### Basic: