295712 - DCD - Wear, Corrosion and Degradation

Degree competences to which the subject contributes

Specific:

CEMT-20. Knowledge of the mechanical, electronic, chemical and biological behaviour of materials, and the ability to apply it in designing, calculating and modelling aspects of elements, components and equipment.

CEMT-24. Knowledge of and the capacity for the evaluation of the safety, durability and structural integrity of materials and components that are manufactured with these materials.

Transversal:

06 URI N3. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

05 TEQ N3. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

Teaching methodology

Two methodologies will be applied during the lessons:

a) Expositive method by using the material available in plataform Atenea
b) Exercises resolution in groups formed by 3-4 students by means cooperative work in classroom. Individual evaluation will be carried out at the end of the session.

Learning objectives of the subject

The main objective is to prepare specialists technics in corrosion in order to avoid the economics loss in public and privates enterprises.

Specific objectives:

Know the thermodynamic and kinetics basis of the corrosion.

Anticipate the corrosion and apply the

Study and diagnose different types of corrosion.
Select suitably the corrosion resistant materials.
Corrosion prevention and protection solutions.
Know the basic fundamental of wear, degradation and corrosion.
Study and diagnose different types of wear, degradation and corrosion

**Study load**

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 60h</th>
<th>40.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours small group: 0h</td>
<td>0.00%</td>
</tr>
<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. Introduction. Corrosion basics. Thermodynamic aspects. Nernst equation</td>
<td>6h</td>
<td>2h</td>
<td>2h</td>
<td>0h</td>
<td>2h</td>
</tr>
<tr>
<td>2. Pourbaix diagrams obtention. Applications.</td>
<td>6h</td>
<td>2h</td>
<td>2h</td>
<td></td>
<td>2h</td>
</tr>
<tr>
<td>4. Types of corrosion. Environmental, water, soil, microbiological and marine corrosion. Galvanic, uniform, located, intergranular and stress corrosion cracking.</td>
<td>6h</td>
<td>2h</td>
<td>2h</td>
<td></td>
<td>2h</td>
</tr>
<tr>
<td>5. Cathodic protection. Protection by sacrificial anodes. Characteristics of the sacrificial anodes. Anodes number calculation and their probable life. Protection by impressed current. Applications.</td>
<td>4h</td>
<td>1h</td>
<td>1h</td>
<td></td>
<td>2h</td>
</tr>
</tbody>
</table>
## Chapter 7

**Learning time:** 12h  
- Theory classes: 4h  
- Practical classes: 4h  
- Self study: 4h

**Description:**  

## Chapter 8

**Learning time:** 5h 30m  
- Theory classes: 2h  
- Practical classes: 2h  
- Self study: 1h 30m

**Description:**  

## Chapter 9

**Learning time:** 17h  
- Theory classes: 6h  
- Practical classes: 5h  
- Self study: 6h

**Description:**  
## Planning of activities

<table>
<thead>
<tr>
<th>Continuous Evaluation</th>
<th>Hours: 2h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
</tr>
</tbody>
</table>

### Continuous Evaluation 1

**Description:**
Exercises resolution of unit 1

**Support materials:**
Work exercises of unit 1

**Descriptions of the assignments due and their relation to the assessment:**
At the end of the session

**Specific objectives:**
Evaluation of the exercises session profit

### Continuous Evaluation 2

**Description:**
Exercises resolution of unit 2

**Support materials:**
Work exercises of unit 2

**Descriptions of the assignments due and their relation to the assessment:**
At the end of the session

**Specific objectives:**
Evaluation of the exercises session profit

### Continuous Evaluation 3

**Description:**
Exercises resolution of unit 3

**Support materials:**
Work exercises of unit 3

**Descriptions of the assignments due and their relation to the assessment:**
At the end of the session

**Specific objectives:**
Evaluation of the exercises session profit

### Continuous Evaluation 4

**Description:**
Exercises resolution of unit 4

**Support materials:**
Work exercises of unit 4

**Descriptions of the assignments due and their relation to the assessment:**
At the end of the session

**Specific objectives:**
Evaluation of the exercises session profit

**Theory classes: 2h**
## Support materials:
- Work exercises of unit 4

## Descriptions of the assignments due and their relation to the assessment:
- At the end of the session

## Specific objectives:
- Evaluation of the exercises session profit

### CONTINUOUS EVALUATION 5

<table>
<thead>
<tr>
<th>Description:</th>
<th>Exercises resolution of unit 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support materials:</td>
<td>Work exercises of unit 5</td>
</tr>
<tr>
<td>Descriptions of the assignments due and their relation to the assessment:</td>
<td>At the end of the session</td>
</tr>
<tr>
<td>Specific objectives:</td>
<td>Evaluation of the exercises session profit</td>
</tr>
<tr>
<td>Hours:</td>
<td>2h</td>
</tr>
<tr>
<td>Theory classes:</td>
<td>2h</td>
</tr>
</tbody>
</table>

### CONTINUOUS EVALUATION 6

<table>
<thead>
<tr>
<th>Description:</th>
<th>Exercises resolution of unit 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support materials:</td>
<td>Work exercises of unit 6</td>
</tr>
<tr>
<td>Descriptions of the assignments due and their relation to the assessment:</td>
<td>At the end of the session</td>
</tr>
<tr>
<td>Specific objectives:</td>
<td>Evaluation of the exercises session profit</td>
</tr>
<tr>
<td>Hours:</td>
<td>2h</td>
</tr>
<tr>
<td>Theory classes:</td>
<td>2h</td>
</tr>
</tbody>
</table>

### CONTINUOUS EVALUATION 7

<table>
<thead>
<tr>
<th>Description:</th>
<th>Presentation of real cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptions of the assignments due and their relation to the assessment:</td>
<td>Programmed by the professor</td>
</tr>
<tr>
<td>Specific objectives:</td>
<td>Evaluation of the unit 7 profit</td>
</tr>
<tr>
<td>Hours:</td>
<td>2h</td>
</tr>
<tr>
<td>Theory classes:</td>
<td>2h</td>
</tr>
</tbody>
</table>
The two parts of the contents, Corrosion on the one hand and Wear and Degradation on the other hand, are evaluated separately (50% by part). When the part of Corrosion is finished, there is one eliminatory exam. If this exam is overcome, this part will not be evaluated in the final exam. If this part is not overcome, must be evaluated in the final exam. In each part, the activities corresponding to continuous evaluation will have a weight of 40% in final qualification, being the 60% corresponding to the exam. Continuous evaluation of the exercises sessions and other activities proposed by the professor.

Reevaluation will replace the qualification of final exam, remaining unchanged the continuous evaluation. The students will be able to access the re-assessment test that meets the requirements set by the EEBE in its Assessment and Permanence Regulations (https://eebe.upc.edu/ca/estudis/normatives-academiques/documents/eebe-normativa-avaluacio-i-permanencia-18-19-aprovat-je-2018-06-13.pdf)

Qualification system

Complementary material will be available for the student during the proves if it is specifically indicated by the professor.
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Bibliography

Basic:


Complementary:
