240EM113 - Electrical, Magnetic, Optical and Thermal Properties of Materials

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 702 - CMEM - Department of Materials Science Science and Metallurgy
Academic year: 2019
Degree: MASTER'S DEGREE IN MATERIALS SCIENCE AND ENGINEERING (Syllabus 2014). (Teaching unit Optional)
ERASMUS MUNDUS MASTER'S DEGREE IN ADVANCED MATERIALS SCIENCE AND ENGINEERING (Syllabus 2009). (Teaching unit Optional)
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MASTER'S DEGREE IN MATERIALS SCIENCE AND ENGINEERING (Syllabus 2014). (Teaching unit Optional)
ECTS credits: 3
Teaching languages: Spanish

Teaching staff
Coordinator: Roa Rovira, Joan Josep
Others: Roa Rovira, Joan Josep

Degree competences to which the subject contributes

Specific:
CEMCEM-01. (ENG) Aplicar coneixements de matemàtiques, física, química, biologia i altres ciències naturals, obtinguts mitjançant estudi, experiència i, pràctica, amb raonament crític per a establir solucions viables a problemes tècnics.
CEMCEM-04. (ENG) Realitzar estudis de caracterització, avaluació i certificació de materials segons les seves aplicacions

Transversal:
06 URI N2. EFFECTIVE USE OF INFORMATION RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.

Teaching methodology

Subject in process of extinction. There is no teaching, the students that enroll it do so only with the right to an exam.

Learning objectives of the subject

The aim of the course is that students acquire basic knowledge about the physical properties of materials. At the end of the course the student should be able to:

- Understand the basics of solid state physics
- Identify the main optical effects of materials and understand the interaction between light and materials
- Classify materials according to their electrical behavior. Relate the macroscopic electrical behavior with the behavior of electrons in materials
- Differentiate between the different magnetic responses of materials. Identify the main magnetic parameters of ferromagnetic and ferrimagnetic materials
## Study load

<table>
<thead>
<tr>
<th>Total learning time: 75h</th>
<th>Hours large group:</th>
<th>18h</th>
<th>24.00%</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>9h</td>
<td>12.00%</td>
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<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>48h</td>
<td>64.00%</td>
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## Content

| **Introduction to Solid State Physics** | **Learning time**: 22h  
Theory classes: 8h  
Self study: 14h |
| **Description:**  
| **Electricity** | **Learning time**: 19h  
Theory classes: 8h  
Self study: 11h |
| **Description:**  
| **Magnetism** | **Learning time**: 15h  
Theory classes: 6h  
Self study: 9h |
| **Description:**  
| **Optics** | **Learning time**: 13h  
Theory classes: 9h  
Laboratory classes: 4h |
| **Description:**  
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<table>
<thead>
<tr>
<th>Thermal properties</th>
<th>Learning time: 6h</th>
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</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Theory classes: 2h</td>
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</table>

**Qualification system**

Subject in process of extinction. There is only one final test that corresponds to 100% of the final grade of the subject.

**Bibliography**

**Basic:**

**Complementary:**