Degree competences to which the subject contributes

Specific:
CEMCEM-02. (ENG) Disenyar i desenvolupar productes, processos, sistemes i serveis, així com l’optimització d’altres ja desenvolupats, atent a la selecció de materials per a aplicacions específiques
CEMCEM-04. (ENG) Realitzar estudis de caracterització, avaluació i certificació de materials segons les seves aplicacions

Transversal:
03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

Teaching methodology

master class

Learning objectives of the subject

The objective of this subject is to acquire fundamental knowledge about material technology in some functional applications (electrical, optical, magnetic and thermal).
## Study load

<table>
<thead>
<tr>
<th>Description</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learning time</td>
<td>112h 30m</td>
<td></td>
</tr>
<tr>
<td>Hours large group</td>
<td>27h</td>
<td>24.00%</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Hours small group</td>
<td>13h 30m</td>
<td>12.00%</td>
</tr>
<tr>
<td>Guided activities</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Self study</td>
<td>72h</td>
<td>64.00%</td>
</tr>
</tbody>
</table>
## Content

### Light and Materials

**Description:**
- Colorimetry
- Causes of color in Materials
- Color due to Electronic and Molecular Transitions
- Color due to Band transitions
- Dyes and pigments
- Materials for laser. Laser types
- Laser-materials interaction
- Materials for Lighting: LEDs, fluorescence and incandescence

**Learning time:** 37h 30m
- Theory classes: 13h 30m
- Guided activities: 9h
- Self study: 15h

### Electrical and Magnetic Response

**Description:**
- Materials for hard magnets
- Materials for soft magnets
- Materials for magnetic information storage
- Thermocouples
- Cooling by Peltier effect
- Thermoelectric generators
- Superconducting materials

**Learning time:** 37h 30m
- Theory classes: 13h 30m
- Guided activities: 9h
- Self study: 15h

### Further topics on functional materials

**Description:**
- Manufacture of monocrystals
- Thermal barrier coatings
- Materials Acoustics
- Materials for musical instruments

**Learning time:** 37h 30m
- Theory classes: 13h 30m
- Guided activities: 9h
- Self study: 15h
240EM135 - Functional Materials

**Qualification system**

NF = 0.5EX + 0.2P + 0.2TF + 0.1NEC  
NF = Course Grade  
EX = End-term exam  
P = Mid-term exam  
TF = Presentation  
NEC = Class grade

**Regulations for carrying out activities**

Calculator

**Bibliography**

**Basic:**


**Complementary:**