295702 - PCO - Plastic and Composites

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 702 - CMEM - Department of Materials Science and Metallurgy
Academic year: 2017
Degree: BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Degree competences to which the subject contributes

Specific:
1. Knowledge of science, technology and materials' chemistry fundaments. Understanding the relation between microstructure, synthesis or processing and materials' properties.
2. Knowledge and application of materials' technology in the following fields: production, transformation, processing, selection, control, maintenance, recycling, and storage of any type of materials.
3. Knowledge and capacities to evaluate security, durability, and structural integrity of materials and components 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.

Teaching methodology

During the course there will be three types of sessions: theory, problems, and laboratory practices. In addition autonomous learning to relate knowledge acquired in practices with theoretical fundaments. Two exams will take place.

Learning objectives of the subject

The objective is that the student acquires basic knowledge on the structure, properties, manufacturing, design and service behaviour of polymeric materials and composite materials.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 45h</th>
<th>30.00%</th>
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<tr>
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<td>Hours medium group: 0h</td>
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<td>Hours small group: 15h</td>
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<td>Guided activities: 90h</td>
<td>60.00%</td>
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# Content

<table>
<thead>
<tr>
<th>TOPIC I. Introduction to polymeric materials</th>
<th>Learning time: 13h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 5h</td>
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<td>Self study : 8h</td>
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**Description:**
History of polymers technology. Production and consumption. Applications in markets. General concepts on polymerisation and polymers structure.

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<thead>
<tr>
<th>TOPIC II: Plastics Technology</th>
<th>Learning time: 26h</th>
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<tr>
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<td>Theory classes: 8h</td>
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<td>Laboratory classes: 3h</td>
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<td>Self study : 15h</td>
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**Description:**
Classification of plastic materials according to their molecular structure and to their consumption. Natural polymers. Description of plastic material families: polyolefines, styrenic, halogenated polymers, polyamides, linear polyesters, PMMA, POM. High performance polymers. Thermostables and elastomers. Polymers obtained from renewable sources and biodegradable (biopolymers). Additives.

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<tr>
<th>TOPIC III: Structure-properties relation</th>
<th>Learning time: 20h</th>
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<tr>
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<td>Theory classes: 7h</td>
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<td>Practical classes: 1h</td>
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<td>Self study : 12h</td>
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**Description:**
Relation between structure and the following properties: mechanics, chemical, optical and electric. Service behaviour.

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<tr>
<th>TOPIC IV: Thermoplastics processing technology</th>
<th>Learning time: 47h</th>
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<tr>
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<td>Theory classes: 13h</td>
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<tr>
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<td>Practical classes: 3h</td>
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<tr>
<td></td>
<td>Laboratory classes: 3h</td>
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<td>Self study : 28h</td>
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**Description:**
### TOPIC V: Composite materials

**Learning time:** 23h  
- Theory classes: 5h  
- Practical classes: 1h  
- Laboratory classes: 3h  
- Self study: 14h

**Description:**  

### TOPIC VI: Environmental aspects

**Learning time:** 20h  
- Theory classes: 5h  
- Laboratory classes: 3h  
- Self study: 12h

**Description:**  
Post-consumption waste. Waste alternatives. Ecodesign principles. ACV. Primary, secondary, tertiary and quaternary recycling. Practical cases.

### Qualification system

50% Final exam + 25% Partial Exam + 15% Practices (Activity 1) + 10% Presentation (Activity 2).
Bibliography

Basic:


Complementary:


Others resources:

Educational material available in ATENEA.