Course guide
295708 - PEMM - Electrical and Magnetic Properties of Materials

Unit in charge: Barcelona East School of Engineering
Teaching unit: 702 - CEM - Department of Materials Science and Engineering.
Degree: BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Compulsory subject).
Academic year: 2022 ECTS Credits: 6.0 Languages: Spanish

DEGREE COMPETENCES TO WHICH THE SUBJECT CONtributes

Specific:
CEM1. Knowledge on several types of materials' structure, as well as analysis characterisation and techniques of materials.
CE9. Knowledge of science, technology and materials' chemistry fundaments. Understanding the relation between microstructure, synthesis or processing and materials’ properties.
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.

Transversal:
04 COE N3. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.

TEACHING METHODOLOGY

During the course theory and problems, along with experimental demonstrations are taugh. Several tests are performed, as well as a presentation and laboratory.

LEARNING OBJECTIVES OF THE SUBJECT

The aim of the course is to help 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 as well as the behaviour of electrons in solids
? Classify materials according to their electrical behavior. Relate the macroscopic electrical behavior with the behavior of electrons in materials
? Distinguish the different magnetic responses of materials. Identify key parameters of ferro magnetic and ferrimagnetic materials

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>45,0</td>
<td>30.00</td>
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</tbody>
</table>
Total learning time: 150 h

CONTENTS

UNIT I: Introduction to Solid State Physics

Description:

Full-or-part-time: 50h
Theory classes: 12h
Practical classes: 8h
Self study : 30h

UNIT II: Electrical behavior of materials

Description:

Full-or-part-time: 50h
Theory classes: 12h
Practical classes: 8h
Self study : 30h

UNIT III: Magnetic behavior of materials

Description:
Types of magnetism. Curie temperature. Ferro and ferrimagnetic materials. Domains. superconductivity

Full-or-part-time: 50h
Theory classes: 12h
Practical classes: 8h
Self study : 30h

GRADING SYSTEM

Final Exam 50% + 30% Partial Tests + 5% presentation+ 15% lab
NO reevaluation

BIBLIOGRAPHY

Basic:

Complementary: