Course guides
230855 - FM - Physics of Materials

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 748 - FIS - Department of Physics.
Degree: MASTER'S DEGREE IN ENGINEERING PHYSICS (Syllabus 2018). (Optional subject).
Academic year: 2020  ECTS Credits: 4.0  Languages: English

LECTURER
Coordinating lecturer: Pineda Soler, Eloy
Lloveras Muntane, Pol Marcel

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Basic:
CB6. (ENG) Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

TEACHING METHODOLOGY

Lectures: In the lectures the contents of the subject are exposed orally by a teacher without the active participation of the students.
Conferences: Presentations on a subject of scientific-technical character carried out by an expert in concrete items of the program.
Problem solving: In the problem solving activity, the teacher presents an exercise / problem that the student must solve, either working individually or in a team.
Projects: Active teaching methodology that promotes learning from the realization of a project: idea, design, planning, development and evaluation of the project.

LEARNING OBJECTIVES OF THE SUBJECT

Ability to understand the physical origin and to evaluate the response of the materials to a mechanical, electrical or magnetic external stimulus.
To understand the coupling between the different properties and the multi-response mechanisms of the materials.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Self study</td>
<td>64,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>36,0</td>
<td>36.00</td>
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</tbody>
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Total learning time: 100 h
CONTENTS

Mechanical properties

Description:
1. Elasticity and related properties
2. Non-linear mechanical properties
3. Thermal expansion and isothermal compressibility

Full-or-part-time: 9h
Theory classes: 9h

Optical and electrical properties

Description:
1. Polarization and polarization mechanisms
2. Ferroelectricity, Pyroelectricity, Piezoelectricity
3. Dielectric response to variable frequency electric fields
4. Optical response of materials

Full-or-part-time: 9h
Theory classes: 9h

Magnetic properties

Description:
1. Diamagnetism
2. Paramagnetism
3. Ferromagnetism
4. Other types of magnetism: ferrimagnetism, antiferromagnetism and non-collinear ferromagnetism

Full-or-part-time: 9h
Theory classes: 9h

Mechanical, electrical and magnetic coupling

Description:
1. Ferroic transitions
2. Multiferroic coupling: Magnetoelasticity and magneto-electricity

Full-or-part-time: 9h
Theory classes: 9h

GRADING SYSTEM

N1: Written tests. Exams, questionnaires, application activities and problem solving. N1 can be replaced by the mark of the re-evaluation exam.
N2: Reports done by the student. Memories, dossiers and projects.

Final qualification = 0.6N1 + 0.4N2