

230855 - FM - Physics of Materials

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
 Teaching unit: 748 - FIS - Department of Physics
 Academic year: 2019
 Degree: MASTER'S DEGREE IN ENGINEERING PHYSICS (Syllabus 2018). (Teaching unit Optional)
 ECTS credits: 4 Teaching languages: English

Teaching staff

Coordinator: Pineda Soler, Eloy
 Lloveras Muntane, Pol Marcel

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

Total learning time: 100h	Hours large group:	36h	36.00%
	Self study:	64h	64.00%

230855 - FM - Physics of Materials

Content

<p>Mechanical properties</p>	<p>Learning time: 9h Theory classes: 9h</p>
<p>Description:</p> <ol style="list-style-type: none"> 1. Elasticity and related properties 2. Non-linear mechanical properties 3. Thermal expansion and isothermal compressibility 	
<p>Optical and electrical properties</p>	<p>Learning time: 9h Theory classes: 9h</p>
<p>Description:</p> <ol style="list-style-type: none"> 1. Polarization and polarization mechanisms 2. Ferroelectricity, Pyroelectricity, Piezoelectricity 3. Dielectric response to variable frequency electric fields 4. Optical response of materials 	
<p>Magnetic properties</p>	<p>Learning time: 9h Theory classes: 9h</p>
<p>Description:</p> <ol style="list-style-type: none"> 1. Diamagnetism 2. Paramagnetism 3. Ferromagnetism 4. Other types of magnetism: ferrimagnetism, antiferromagnetism and non-collinear ferromagnetism 	
<p>Mechanical, electrical and magnetic coupling</p>	<p>Learning time: 9h Theory classes: 9h</p>
<p>Description:</p> <ol style="list-style-type: none"> 1. Ferroic transitions 2. Multiferroic coupling: Magnetoelasticity and magnetoelectricity 	



230855 - FM - Physics of Materials

Qualification 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 = $0.6N1 + 0.4N2$

Bibliography