

Course guides

230855 - FM - Physics of Materials

Last modified: 29/04/2020

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

Type	Hours	Percentage
Self study	64,0	64.00
Hours large group	36,0	36.00

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 magnetoelectricity

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 = $0.6N1 + 0.4N2$