

26930 - Solid State II

Syllabus Information

Academic Year: 2021/22

Subject: 26930 - Estado sólido II

Faculty / School: 100 - Facultad de Ciencias

Degree: 447 - Degree in Physics

ECTS: 6.0

Year: 4

Semester: Second semester

Subject Type: Compulsory

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. The course is organized by combining lectures, student presentation and practice lessons. In order to achieve the intended goals the strategy chosen by the teaching staff consists of using lectures for presenting to the students the basic knowledge required to face the solving problems session and laboratory practice. Interactive problem resolution classes and laboratory sessions will be conveniently intertwined.

4.2. Learning tasks

The 6 ECTS course includes the following learning tasks:

- Lectures (4.5 ECTS: 45 hours).
- Interactive solving problems sessions (1.0 ECTS: 10 hours).
- Laboratory sessions (0.5 ECTS: 5 hours). Laboratory reports must be submitted not later than 15 days before the theoretical-practical assessment. They will be announced by the professor at the beginning of the course.

Laboratory reports must be delivered not later than 15 days before the theoretical-practical examination.

4.3. Syllabus

Topic I: Dielectrics and ferroelectrics: Macroscopic description. Microscopic theory: polarizability. Ferroelectricity. Theory of phase transitions.

Topic II: Diamagnetism and paramagnetism: Localized and free electrons. Classical and quantum theories.

Topic III: Ferromagnetism: Long-range order. Exchange interaction. Mean field theory. Magnetism of metals and insulators. Antiferro and ferrimagnetism. Magnetic domains.

Topic IV: Superconductivity: Meissner Effect. Superconducting gap. Classical and quantum theory. Vortex networks. Reflection Andreev. Josephson effect.

Topic V: Nanostructures: Observation techniques. Nanoparticles. Thin films.

4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the Facultad de Ciencias web , <https://ciencias.unizar.es/grado-en-fisica-0>

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=26930>