

Subject	PHYSICS OF PHOTOVOLTAIC MATERIALS
Credits	3 ECTS (3T)
Character	PV-cells track
Semester	1st
Language	Spanish

Competences

CG3 - Creativity: To conceive, develop and validate new systems that can increase the quality of life of people; to carry out, in academic and professional contexts, innovations or technological advances that can advance the state of the art

CG5 - Information management: to search for and manage appropriate bibliographic resources efficiently, to learn to continue studies in a largely autonomous way as a basis for future research and innovation activity

CG7 - Work in international contexts: To carry out a substantial research process with academic seriousness and integrity, integrated in an R+D+i group with international projection

CG8 - Apply methodologies, procedures, tools and state-of-the-art standards for the creation of new technological components; build new hypotheses and models, evaluate them and apply them to problem solving

CG9 - Communicate judgments and knowledge to specialized and non-specialized audiences in a reasoned, clear and unambiguous manner.

CB6 - Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context

CB7 - Students should be able to apply their acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study

CB8 - Students are able to integrate knowledge and face the complexity of making judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities related to the application of their knowledge and judgments.

CB9 - Students should be able to communicate their conclusions and the ultimate knowledge and rationale behind them to specialized and non-specialized audiences in a clear and unambiguous manner

CB10 - Students possess the learning skills that will enable them to continue studying in a largely self-directed or autonomous manner..

CT4 - Team leadership: to carry out team work (such as those of some of the evaluation activities of the subjects), to integrate into a research group by actively participating in its meetings, collaborating with own initiative in R+D+i works or projects; to interact effectively with the members of the multidisciplinary work team.

CE2 - Knowledge, analysis and proposals of new concepts, methods or devices for photovoltaic conversion.

CE6 - Apply design methodologies and implementation of automatic learning and classification techniques for intelligent knowledge management.

Outcomes

RA24 - Knowledge of the physical fundamentals of solar cells.

RA27 - Critical ability to analyze the different models in terms of basic principles of physics.

RA36 - Knowing the physical effects that allow the use of solar energy

RA37 - Understand the relevant physical principles that affect the operation of solar cells.

RA38 - Applied training in materials physics

RA39 - Ability to understand the physical fundamentals of current and next-generation solar cells

RA56 - Training in quantum physics and thermodynamics applied to solar cells

Description and syllabus

Presentation of the fundamentals of solid state theory and semiconductor theory as applied to solar photovoltaic energy.

1. Conductive and semiconductor materials, crystalline and amorphous.
2. Crystalline structure. Electronic structure.
3. Principles of statistical physics of electrons, phonons and photons.
4. Equilibrium, weak excitation, transport phenomena, intense fields.
5. Mechanisms and statistics of generation-recombination.
6. Photonic absorption, optical properties and parameters.
7. Basic semiconductor equations.