

Department (Faculty)

Ingeniería Electrónica (ETSI de Telecomunicación)

Module

New Materials and Emergent Technologies

Code

43000335

ECTS credits

3

Type

Optional

Year/Semester

1/2

Schedule

Spring semester

Language

English

Objectives

Due to its short duration and very broad topic, as well as its evolving content, the main objective of this module is to provide a first approach to the new topics in electronic and functional materials, as well as the emerging technologies. Most of the sessions will be given by recognized experts in the field. The main focus will be scientific and technological, although other aspects such as the labour, social and political impact of the emerging technologies will be overviewed.

Prerequisites

None

Previous knowledge recommended

All obligatory modules in the first quarter, and most modules of the itinerary/route of Functional Materials

Coordination with other subjects

Modules of the Master of Materials Engineering Program, in particular: Functional Materials at Macro and Micro/Nanometer Scales, Materials and Applications in NanoTechnology, Materials for Electronic and Optoelectronic Devices, Polymeric Materials for Advanced Applications, Materials and Microfabrication Technologies for Electronic Devices, and Spintronics and Nanomagnetism

Generic Competencies

CG1, Use of english language
CG2, Capacity for teamwork
CG3, Spoken and written communication skills
CG4, Use of communication and Information technologies
CG7, Planning and organizational capacity
CG9, Capacity of interdisciplinary work

Specific Competencies

CE1, Knowledge of the structure of materials and the techniques for their characterization and analysis
CE5, Capacity for autonomous learning
CE6, Capacity for designing, assessment, selection and manufacture of materials

Contents and Schedule

The contents of the course will be variable, though a list of intended topics is given below.

Student participation will include assistance to lectures and to discussion sessions afterwards. In addition, within the framework of this module, the students will write a paper on a specific topic suggested or approved by the professor, and present it in class.

A visit to facilities of Universities, Research Centers or Industries in Madrid will be scheduled

Weeks	Description	LM	Presentations
1	Prospective and emerging technologies	2 h	
2-10	Invited talks on different topics, such as Materials: - Graphene - 2D crystals - Metamaterials and photonic crystals - Solgel and aerogels - Programmable matter, synthetic biology Technologies - Atomic layer deposition - 3D printing, bioprinting - Molecular assembler - Advanced lithographies - Flexible electronics - Bionanomechanics - Artificial photosynthesis - Artificial intelligence and robotics	18 h	
11	Visit to high tech facilities	2+2 h	
12	Impact of emerging technologies on labour, society and politics – Debate	2 h	
13 - 14	Presentation of works by students		4 h

Tutorials, Office hours

Student-speaker and student-student interactions will be favored by means of discussion during the sessions and debates afterwards.

Office hours give students the opportunity to explore different topics of interest and to ask in-depth questions on their papers and presentations.



Evaluation

The progress of the students will be monitored through their paper and presentation (70%). In addition, all students will be required to participate during the talks by experts, and their comments/questions will be recorded and evaluated (30%).

Bibliography

Bibliography on the different talks will be provided with the abstract and speakers' bio.

Teaching Staff

Fernando Calle Gómez (CU) (coordinator)
Invited speakers