Course Guide
M10-44426 Current issues in nanoscience and molecular nanotechnology

COURSE DATA

Data Subject	
Code	M10-44426
Name	Current issues in nanoscience and molecular nanotechnology
Cycle	Master's degree
ECTS Credits	6.0

Study (s)

Degree	Center	Acad. year	Period
2208 - Master's Degree in Molecular Nanoscience and Nanotechnology	Faculty of Chemistry	1	Second term

Subject-matter

Degree	Subject-matter	Character
2208 - Master's Degree in Molecular Nanoscience and Nanotechnology	10 - Current issues in nanoscience and molecular nanotechnology	Obligatory

Coordination

Name	Department
CORONADO MIRALLES, EUGENIO	320 - Inorganic Chemistry- U. de València

SUMMARY

Lectures and seminars given by specialists on this topic showing the state-of-the-art in this field.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Previous knowledge of chemistry, physics or materials science as taught in the degrees indicated in the recommended entry profile to the master's degree is required. Previous knowledge of molecular nanoscience and nanotechnology as taught in the Introduction and Basic Modules is required.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

2208 - Master's Degree in Molecular Nanoscience and Nanotechnology

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- To possess the necessary knowledge and abilities to continue with future studies in the PhD program in Nanoscience and Nanotechnology.
- For students from field of knowledge (e.g. chemistry) to be able to scientifically communicate and interact with colleagues from another field (e.g. physics) in the resolution of problems laid out by the Molecular Nanoscience and Nanotechnology.
- To know the molecular nanoscience "state of the art".
- To know the 'state of the art' in molecular nanomaterials with optical, electric and magnetic properties.
- To assess the relationships and differences between the materials macroscopic properties and those of unimolecular systems and nanomaterials.
- To assess the molecules and hybrid materials relevance in electronics, spintronics and molecular nanomagnetism.
- To know the main biological and medical application in this area.
- To know the main molecular nanomaterials technological applications and to be able to put them in the Material Science general context.
- To know the technical and conceptual problems laid out by the physical properties measurement in single molecular systems (charge transport, optical properties, magnetic properties).
- To know the main applications of nanoparticles and nanostructured materials ?obtained or functionalised using a molecular approach- in magnetism, molecular electronics and biomedicine.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

Presentation of the state-of-the-art in this field by talks given by specialists on this topic.

DESCRIPTION OF CONTENTS

1. European School on Molecular Nanosciencie (ESMolNa)

Lectures and seminars given by specialists on this topic showing the state-of-the-art on this field.

The European School on Molecular Nanoscience (ESMolNa) is organized annually since 2008, with the participation of the most active European research groups working on this topic.

During this school the state-of-the-art in this field is discussed from the perspective of the different disciplines that integrate the field (molecular magnetism, molecular electronics, molecular nanoscience and materials science, etc.). At the same time a discussion forum is created where young researchers (master and PhD students from all around Europe) have the opportunity to present their recent research results in front of a distinguished scientific community.

This school is essential for the cohesion of the interuniversity program and for the creation of a scientific community working in these areas, since it represents the main meeting point for students of this master program with other students, researchers and professors active in this field. Students will give an oral communication showing their results during their research activity, allowing an assessment of the activities carried out by them.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	40,00	100
Tutorials	15,00	100
Seminars	1,00	100
Development of individual work	20,00	0
Study and independent work	40,00	0
Preparing lectures	34,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

Students will attend **talks** by leading European researchers working in the field of molecular nanoscience. During the general lectures, essential aspects of this scientific field will be presented and in the specialised lectures some of the most recent and relevant scientific advances of the different participating research groups will be shown.

In addition, students will be able to present the scientific results of their master dissertation in a short **oral presentation** to the school's audience.

There will also be forums for **debate** on the topics covered, formally after each of the talks and informally throughout the whole of the students' stay at the school.

Through all these activities, students will acquire the competences described in the corresponding section.

EVALUATION

The acquisition of the competences of the subject will be assessed by means of a written exam. The mark of this exam will represent 90% of the final mark of the subject.

Student participation during the school (presentation of a short talk and intervention during the debates) will represent 10% of the final grade.

To pass the course, students must have attended 80% of the lectures.

REFERENCES

Basic

Review and perspective articles appeared in publications such as: Science, Nature, Accounts of Chemical Research, Chemical Reviews, Advanced Materials, Reviews on Modern Physics, etc.