

**COURSE DATA****DATA SUBJECT****Code:** 44426**Name:** Current issues in nanoscience and molecular nanotechnology**Cycle:** Master's Degree**ECTS Credits:** 6**Academic year:** 2026-27**STUDY (S)**

Degree	Center	Acad. year	Period
2208 - Master's Degree in Molecular Nanoscience and Nanotechnology	Facultat de Química	1	Second quarter

SUBJECT-MATTER

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

COORDINATION

CORONADO MIRALLES EUGENIO

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 / LEARNING OUTCOMES**2208 - Master's Degree in Molecular 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.

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 assess the molecules and hybrid materials relevance in electronics, spintronics and molecular nanomagnetism.

To assess the relationships and differences between the materials macroscopic properties and those of unimolecular systems and nanomaterials.

To know the main applications of nanoparticles and nanostructured materials obtained or functionalised using a molecular approach- in magnetism, molecular electronics and biomedicine.

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 molecular nanoscience "state of the art".

To know the state of the art in molecular nanomaterials with optical, electric and magnetic properties.

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 possess the necessary knowledge and abilities to continue with future studies in the PhD program in Nanoscience and Nanotechnology.

DESCRIPTION OF CONTENTS



1. European School on Molecular Nanoscience (ESMoIa)

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

The European School on Molecular Nanoscience (ESMoIa) 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

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	15,00
Theory	40,00
Seminar	10,00
Total hours	65,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	1,00
Individual or group project	50,00
Independent study and work	0,00
Preparation of lessons	34,00
Preparation for assessment activities	10,00
Resolution of case studies	0,00
Total hours	95,00

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

Students' active participation in school will be assessed: presentation of short talks and intervention during discussions.

REFERENCES

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