

**COURSE DATA****Data Subject**

|                      |  |
|----------------------|--|
| <b>Code</b>          | 44426  |
| <b>Name</b>          | Current issues in nanoscience and molecular nanotechnology |
| <b>Cycle</b>         | Master's degree  |
| <b>ECTS Credits</b>  | 6.0  |
| <b>Academic year</b> | 2023 - 2024  |

**Study (s)**

| <b>Degree</b>   | <b>Center</b>        | <b>Acad. year</b> | <b>Period</b> |
|---|----------------------|-------------------|---------------|
| 2208 - M.D. in Molecular Nanoscience and Nanotechnology | Faculty of Chemistry | 1                 | Second term   |

**Subject-matter**

| <b>Degree</b>   | <b>Subject-matter</b>   | <b>Character</b> |
|---|---|------------------|
| 2208 - M.D. in Molecular Nanoscience and Nanotechnology | 10 - Current issues in nanoscience and molecular nanotechnology | Obligatory       |

**Coordination**

| <b>Name</b>                | <b>Department</b>         |
|----------------------------|---------------------------|
| CORONADO MIRALLES, EUGENIO | 320 - Inorganic Chemistry |

**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

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

## OUTCOMES

### 2208 - M.D. 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

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                |
| <b>TOTAL</b>                   | <b>150,00</b> |                  |



## TEACHING METHODOLOGY

Theory classes, participatory lectures

Articles discussion.

Chaired debate or discussion.

Specialized conferences.

Attendance to seminars, conferences and round tables.

## EVALUATION

Attendance and active participation in seminars: 5-15%

Oral presentation of the research work: 5-15%

Written exam: 70-90%

## REFERENCES

### Basic

#### - CASTELLANO

Artículos de revisión y de perspectiva aparecidos en las revistas científicas del tipo: Science, Nature, Accounts of Chemical Research, Chemical Reviews, Advanced Materials, Reviews on Modern Physics, etc.

#### ENGLISH

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

#### VALENCIÀ

Articles de revisió i de perspectiva apareguts en revistes científiques del tipus: Science, Nature,



Accounts of Chemical Research, Chemical Reviews, Advanced Materials, Reviews on Modern Physics, etc.  
ern Physics, etc.

