Course Guide

44423 Use of supramolecular chemistry for the preparation of nanostructures and nanomaterials

**COURSE DATA**

<table>
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<tr>
<th>Data/Subject</th>
<th>Details</th>
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<tbody>
<tr>
<td>Código</td>
<td>44423</td>
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<tr>
<td>Name</td>
<td>Use of supramolecular chemistry for the preparation of nanostructures and nanomaterials</td>
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<tr>
<td>Cycle</td>
<td>Master's degree</td>
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<tr>
<td>ECTS Credits</td>
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<tr>
<td>Curso académico</td>
<td>2018 - 2019</td>
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<th>Study (s)</th>
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<th>Period</th>
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<tbody>
<tr>
<td>Degree</td>
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<td>1</td>
<td>First term</td>
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<td>Degree</td>
<td>2208 - M.U. en Nanociencia y Nanotecnología Molecular</td>
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<tr>
<th>Subject-matter</th>
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<tr>
<td>Degree</td>
<td>7 - Use of supramolecular chemistry for the preparation of nanostructures and nanomaterials</td>
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<td>Character</td>
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**Coordination**

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<tr>
<th>Name</th>
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<tr>
<td>CORONADO MIRALLES, EUGENIO</td>
<td>320 - QUÍMICA INORGÁNICA</td>
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**SUMMARY**

The aim is to introduce the students, through advanced lectures, into supramolecular chemistry and its utility to obtain nanostructures and nanomaterials of interest for chemical applications (catalysis, sensors), physical applications (magnetism, molecular electronics) and biomedical applications.

**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.U. en Nanociencia y Nanotecnología Molecular
- Students can apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
- Students are able to integrate knowledge and handle the complexity of formulating judgments based on information that, while being incomplete or limited, includes reflection on social and ethical responsibilities linked to the application of their knowledge and judgments.
- Students have the learning skills that will allow them to continue studying in a way that will be largely self-directed or autonomous.
- Students have the knowledge and understanding that provide a basis or an opportunity for originality in developing and/or applying ideas, often within a research context.
- 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 methodological approaches used in Nanoscience.
- To acquire supramolecular chemistry conceptual concepts necessary for the design of new nanomaterials and nanostructures.
- To know the main techniques for molecular systems nanofabrication.
- To acquire the conceptual knowledge about molecular systems self-assembly and self-organisation.
- To know the main biological and medical application in this area.

LEARNING OUTCOMES

We expect the students to gain knowledge on supramolecular chemistry and its utility to obtain nanostructures and nanomaterials of interest for chemical applications (catalysis, sensors), physical applications (magnetism, molecular electronics) and biomedical applications.

DESCRIPTION OF CONTENTS

1. Supramolecular chemistry use for preparing nanostructures and nanomaterials.
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44423 Use of supramolecular chemistry for the preparation of nanostructures and nanomaterials

1. Self-assembly
   1.1. Hierarchical self-assembly and auto-organization: functional nanostructures and supra-molecular materials with interesting physical or chemical properties; design of bio-molecular architectures; design of functional molecules and nanomaterials with a high level of communication with biological systems and its biomedical applications.
   1.2. Organization of supra-molecular structures in surfaces: Self-assembled monolayers (SAMs).
   1.3. Use of self-assembled structures as templates for growing organic and inorganic nanostructures.
   1.4. Self-assembly of nanoparticles.
   1.5. Chirality in surfaces and its relevance in heterogeneous catalysis. Supramolecular polymers and block copolymers.

2. Crystal engineering
   2.1. Crystal engineering.
   2.2. Crystal structure prediction.
   2.3. Supramolecular interactions: supramolecular synthons, secondary building units and structural databases.
   2.4. Crystallization techniques.
   2.5. Graph set analysis.
   2.7. Powder diffraction.
   2.8. Graphical visualizers

WORKLOAD

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<tr>
<th>ACTIVITY</th>
<th>Hours</th>
<th>% To be attended</th>
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<td>Theory classes</td>
<td>15.00</td>
<td>100</td>
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<tr>
<td>Seminars</td>
<td>5.00</td>
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<tr>
<td>Tutorials</td>
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<tr>
<td>Other activities</td>
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<tr>
<td>Preparation of evaluation activities</td>
<td>37.00</td>
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<tr>
<td>Preparing lectures</td>
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<td><strong>TOTAL</strong></td>
<td><strong>75.00</strong></td>
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TEACHING METHODOLOGY

- Theory classes, participatory lectures
- Articles discussion.
- Chaired debate or discussion.
- Practical cases or seminar problems discussion.
- Seminars.
- Problems.
- Laboratory practices and demonstraciones and visit to installations.
- Experts conferences.
- Attendance to courses, conferences and round tables.
EVALUATION

<table>
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<th>Weightage</th>
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<tr>
<td>Written exam about the subject basic contents</td>
<td>70-90%</td>
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<tr>
<td>Attendance and active participation in seminars.</td>
<td>0-10%</td>
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<tr>
<td>Questions answering</td>
<td>10-20%</td>
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REFERENCES

Basic


Additional
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44423 Use of supramolecular chemistry for the preparation of nanostructures and nanomaterials