



| Teaching Guide | | | | |
|---------------------|---|--------|--|---------|
| Identifying Data | | | 2024/25 | |
| Subject (*) | Supramolecular Chemistry | Code | 610G04027 | |
| Study programme | Grao en Nanociencia e Nanotecnoloxía | | | |
| Descriptors | | | | |
| Cycle | Period | Year | Type | Credits |
| Graduate | 2nd four-month period | Third | Obligatory | 6 |
| Language | SpanishGalicianEnglish | | | |
| Teaching method | Face-to-face | | | |
| Prerequisites | | | | |
| Department | Química | | | |
| Coordinador | Mosquera Mosquera, Jesús | E-mail | j.mosquera1@udc.es | |
| Lecturers | Brandariz Lendoiro, María Isabel Brea Fernández, Roberto Javier Esteban Gomez, David Mosquera Mosquera, Jesús Rodríguez Villar, Jessica | E-mail | i.brandariz@udc.es roberto.brea@udc.es david.esteban@udc.es j.mosquera1@udc.es jessica.rodriguez.villar@udc.es | |
| Web | campusvirtual.udc.es | | | |
| General description | This course is an introduction to supramolecular chemistry and is divided into three fundamental blocks: first, the intermolecular forces that are responsible for the formation of supramolecular structures are studied, to then delve into molecular recognition, classical molecular receptors and metal-organic assembly, to finish studying in the last part, biomimetic supramolecular systems | | | |

| Study programme competences / results | |
|---------------------------------------|---|
| Code | Study programme competences / results |
| A1 | CE1 - Comprender los conceptos, principios, teorías y hechos fundamentales relacionados con la Nanociencia y Nanotecnología. |
| A3 | CE3 - Reconocer y analizar problemas físicos, químicos, matemáticos, biológicos en el ámbito de la Nanociencia y Nanotecnología, así como plantear respuestas o trabajos adecuados para su resolución, incluyendo el uso de fuentes bibliográficas. |
| A4 | CE4 - Desarrollar trabajos de síntesis y preparación, caracterización y estudio de las propiedades de materiales en la nanoescala. |
| A5 | CE5 - Conocer los rasgos estructurales de los nanomateriales, incluyendo las principales técnicas para su identificación y caracterización |
| B2 | CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio |
| B4 | CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado |
| B5 | CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía |
| B8 | CG3 - Aplicar un pensamiento crítico, lógico y creativo. |
| B9 | CG4 - Trabajar de forma autónoma con iniciativa. |
| B11 | CG6 - Comportarse con ética y responsabilidad social como ciudadano/a y como profesional. |
| C2 | CT2 - Dominar la expresión y la comprensión de forma oral y escrita de un idioma extranjero |
| C5 | CT5 - Entender la importancia de la cultura emprendedora y conocer los medios al alcance de las personas emprendedoras |
| C8 | CT8 - Valorar la importancia que tiene la investigación, la innovación y el desarrollo tecnológico en el avance socioeconómico y cultural de la sociedad |
| C9 | CT9 - Tener la capacidad de gestionar tiempos y recursos: desarrollar planes, priorizar actividades, identificar las críticas, establecer plazos y cumplirlos |

Learning outcomes

| Learning outcomes | Study programme competences / results | | |
|--|---------------------------------------|-----------------|----------------------|
| Acquire basic knowledge related to Supramolecular Chemistry. | A1 A3 A4 A5 | | |
| Understand the relationship between the structure of chemical compounds and the formation of supramolecules through molecular recognition and self-assembly processes. | | B2 B4 B5 | |
| Interpret data from experimental observations and use of the various experimental techniques used in their characterization. | | B8 B9 B11 | C2 C5 C8 C9 |
| Understand Supramolecular Chemistry as a tool for the construction of complex systems from perfectly defined units and their application in different areas of research. | | B8 B9 B11 | C2 C5 C8 C9 |

| Contents | |
|-----------------------------------|---|
| Topic | Sub-topic |
| Intermolecular forces | Interactions involving ions, polar and polarizable molecules, Van der Waals forces. Hydrogen bonding, hydrophobic and hydrophilic interactions, colloids. |
| Synthetic supramolecular systems | Molecular recognition, classical molecular receptors, molecular self-assembly, molecular vessels, metal-organic assemblage |
| Biomimetic supramolecular systems | Combinatorial dynamics, Supramolecular chemistry in biological systems, Supramolecular polymers, Molecular motors, tubular structures, systems with response to external stimuli. |
| Lab experiments | Laboratory expLaboratory experiments to illustrate the formation of supramolecular structures and their characterization with different experimental methods and techniques |

| Planning | | | | |
|---------------------------------|--|--------------------------------------|-------------------------------|-------------|
| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | A1 A3 A4 A5 | 28 | 50 | 78 |
| Seminar | B2 B4 B5 B8 B9 | 8 | 32 | 40 |
| Laboratory practice | B9 B11 C2 C5 C8 C9 | 15 | 12 | 27 |
| Mixed objective/subjective test | A1 A3 A4 A5 B2 B4 B5 B8 B9 B11 C2 C5 C8 C9 | 4 | 0 | 4 |
| Personalized attention | | 1 | 0 | 1 |

(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

| Methodologies | |
|--------------------------------|--|
| Methodologies | Description |
| Guest lecture / keynote speech | The fundamental concepts and theories of the subject are explained |



| | |
|---------------------------------|--|
| Seminar | Problems, questions and doubts related to the theoretical contents are solved. In addition, basic computer programs for supramolecular chemistry are also introduced. |
| Laboratory practice | It consists of two stages: Carrying out the assigned experiment in the laboratory Preparation of the internship report in which the results are described and the data obtained is analyzed. |
| Mixed objective/subjective test | It will consist of problems similar to those solved in the seminars and questions related to the theoretical content. |

Personalized attention

| Methodologies | Description |
|--------------------------------|--|
| Laboratory practice Seminar | Attendance at tutorials is recommended to resolve any questions that may arise both in solving problems, as well as for the preparation of the laboratory practice or for questions related to the master classes. |

Assessment

| Methodologies | Competencies / Results | Description | Qualification |
|---------------------------------|--|---|---------------|
| Mixed objective/subjective test | A1 A3 A4 A5 B2 B4 B5 B8 B9 B11 C2 C5 C8 C9 | Written test to answer theoretical questions and solve exercises related to the contents of the lectures, seminars and practices. | 70 |
| Laboratory practice | B9 B11 C2 C5 C8 C9 | In the evaluation of this activity, the laboratory work and the Results Report are taken into account. | 20 |
| Seminar | B2 B4 B5 B8 B9 | The work done by the student in the seminars will be taken into account. | 10 |

Assessment comments

-Attendance to the practices and the delivery of the Report, are essential requirements to pass the subject

-To pass the subject, it will be necessary to obtain a grade of no less than 4.5 out of 10 in the mixed test and to achieve, adding the grades of all the activities, a minimum grade of 5.0.

-If the minimum grade in the final mixed test has not been reached, the subject will appear as failed, and the final grade awarded will be that of the final mixed test (even if the average of the grades obtained in the different methodologies is higher than 5, out of a maximum of 10),

-The registration qualification is granted preferably at the first opportunity.

-In the second opportunity, the mixed test will be repeated and the qualification of the other activities will be maintained.

-The qualification of not presented will be granted to those who do not appear for the mixed test and for the laboratory practice.-Students with recognition of part-time dedication and academic waiver of attendance exemption who cannot attend the seminars, may be assigned different works/problems throughout the course to be exposed during tutoring hours. General considerations:
All aspects related to "academic dispensation", "dedication to study", "permanence", and "academic fraud" will be governed in accordance with the current academic regulations of the UDC.

December advance call:
The weighting in the evaluation of the different teaching activities of the students who participate in the early call in December will be adapted to the new evaluation percentages included in this guide, in case these differ from each other in both academic years.



Sources of information

| | |
|----------------------|---|
| Basic | <ul style="list-style-type: none">- J. W. Steed, J. L. Atwood (2009). Supramolecular Chemistry 2nd Ed. Wiley and Sons- P. A. Gale, J. W. Steed (2012). Supramolecular Chemistry: From molecules to nanomaterials. Wiley and Sons Ltd. (Vol.1 - 2)- Jacob N. Israelachvili (2011). Intermolecular and Surface Forces 3rd ed.. Elsevier- Atkins, P. W. (2006). Physical Chemistry. Oxford ; New York : Oxford University Press, |
| Complementary | <ul style="list-style-type: none">- BERRY R. S., RICE S. A., ROSS J. (2000). Physical Chemistry. 2^a ed.. Oxford University Press, New York- Anslyn, E. V., Dougherty D.A. (2006). Modern Physical Organic Chemistry. University Science Books- Bockris J.O.M., Reddy A K.N. (1998). Modern Electrochemistry 1. Ionics. 2nd ed.. Plenum Press, New York- Steed J. W., Atwood J.L. (2009). Supramolecular Chemistry 2^a ed.. Wiley UK |

Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Other comments

General considerations: All aspects related to "academic dispensation", "dedication to study", "permanence", and "academic fraud" will be governed in accordance with the current academic regulations of the UDC. Gender perspective: - According to the different applicable regulations for university teaching, the gender perspective must be incorporated in this matter (non-sexist language will be used, a bibliography of authors of both sexes will be used, intervention in class of male and female students...)- Work will be done to identify and modify prejudices and sexist attitudes and the environment will be influenced to modify them and promote values of respect and equality.- Situations of discrimination based on gender must be detected and actions and measures to correct them will be proposed.

Green Campus Program Faculty of Sciences To help achieve a sustainable immediate environment and comply with point 6 of the "Environmental Declaration of the Faculty of Sciences (2020)", the documentary work carried out on this matter: a.- They will be requested mostly in virtual format and computer support. b.- If done on paper: - No plastics will be used. - Double-sided printing will be done. - Recycled paper will be used. - Drafts will be avoided.

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.