VNIVERSITAT DE VALÈNCIA

Course Guide
44421 Basic concepts of supramolecular chemistry

COURSE DATA

Data Subject	
Código	44421
Name	Basic concepts of supramolecular chemistry
Cycle	Master's degree
ECTS Credits	3.0
Curso académico	2016 - 2017

Study (s)

Degree	Center	Acad. year	Period
2208 - M.U. en Nanociencia y Nanotecnología Molecular	FACULTY OF CHEMISTRY	1	First term

Subject-matter

Degree	Subject-matter	Character
2208 - M.U. en Nanociencia y Nanotecnología Molecular	5 - Basic concepts of supramolecular chemistry	Obligatory

Coordination

Name	Department
CORONADO MIRALLES, EUGENIO	320 - QUÍMICA INORGÁNICA

SUMMARY

It is intended that students acquire the basic knowledge related to supramolecular chemistry as a tool in building complex systems from well-defined units, the bottom-up approach.

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 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

It is intended that students acquire the basic knowledge related to supramolecular chemistry as a tool in building complex systems from well-defined units, the bottom-up approach.

DESCRIPTION OF CONTENTS

1. Basic concepts of supramolecular chemistry.

1.Basic concepts in supramolecular chemistry: non-covalent interactions nature; ion, molecule and biomolecule recognition; molecular self-assembly and self-association: biological examples; kinetics and thermodynamics aspects;
2.Binding constants. Concept. Measurement of binding constant: techniques. Stoichiometry, job plot.
3.Interactions with Alkali Metals and Transition Metals
4.Molecular topology: catenanes, rotaxanes and knots.
5.Nanoparticle synthesis. Tensoactives: monolayers, micelles, vesicles and capsules.
6.Molecular devices: molecular dyads and switches, logical doors, sensors. Signal amplification and antenna effect.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	15.00	100
Tutorials	5.00	100
Seminars	4.00	100
Other activities	2.00	100
Preparation of evaluation activities	39.00	0
Preparing lectures	10.00	0
TOTAL	**75.00**	

TEACHING METHODOLOGY

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

EVALUATION

Written exam about the subject basic contents	70-90%
Attendance and active participation in seminars.	0-10%
Questions answering	10-20%

REFERENCES

Basic

- - J.W. Steed, J.L. Atwood: Supramolecular Chemistry. Wiley, 2000.
- J.M. Lehn, J.L. Atwood, J.E.D. Davies, D.D. Macnicol, F. Vogtle, D.N. Reinhoudt: Comprehensive Supramolecular Chemistry: Supramolecular Technology. Pergamon, 1996.
- T. Scharader, A.D. Hamilton: Functional Synthetic Receptors, Wiley-VCH, 2005.
- V. Balzani, M. Ventura, A. Credi: Molecular Machines, Wiley-VCH, 2003
- Jorio, M. S. Dresselhaus, G. Dresselhaus. Carbon Nanotubes. Springer, 2008.
- F. Langa, J.F. Nierengarten. Fullerenes: Principles and Applications. RSC Publishing, 2nd. Ed. 2011.
- J. Steed, D. R. Turner, K. J. Wallace, Core Concepts in Supramolecular Chemistry and Nanochemistry. Wiley, 2007.
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- Supramolecular Chemistry: From Molecules to Nanomaterials, ed. P. Gale and J. Steed, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, 2012
- Modern Supramolecular Chemistry, Eds. F. DIEDERICH, P. J. STANG; R. R.
- TYKWINSKI; Wiley-VCH, Weinheim, 2008.