UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Supramolecular Chemistry

2122-1-F5401Q063

Aims

D1 - KNOWLEDGE AND UNDERSTANDING ABILITY

At the end of this training activity, the student must demonstrate to be able to read a scientific article dealing with the synthesis and characterization of supramolecular systems (host-guest chemistry, sensors, self-assembling and biomimetic systems, molecular machines). To achieve this goal during the course a series of very recent articles are analyzed that explain and exemplify the topics covered. The course provides the student with specific knowledge in the following areas:

1 Spectroscopic methods (NMR, UV, IR, microcalorimetry, Surface Plasmon Resonance, Mass) for the determination of molecular interactions

2 Synthesis methods of the main host systems (cavitands, spherands, macrocycles)

3 Main applications of host-guest chemistry

D2 - CAPACITY TO APPLY KNOWLEDGE AND UNDERSTANDING

At the end of this training activity, the student must demonstrate that he is able to:

1 Draw a host molecule given a guest

2 Imagine host-guest systems in different application areas

3 Imagine the best analytical technique for studying a host-guest system

D3 - JUDGMENT AUTONOMY

At the end of this training activity, the student must demonstrate to be able to critically read a scientific article, analyze its contents, judge any weaknesses and strengths of the article, foresee possible experimental and application limitations, imagine creatively further developments of the technique presented by the article. The teacher stimulates the critical discussion of the articles presented in class in order to accustom the student to this type of analysis of scientific literature.

Some students will present insights on specific topics that are then discussed together in the classroom.

D4 - LEARNING SKILLS

Expected results:

1 Collect and understand the new information needed to rationalize the properties of new host-guest systems published in the scientific literature

2 Collect and understand information about the evolution of supramolecular systems and their properties

Contents

Basic concepts in supramolecular chemistry. methods for binding studies. Analysis and study of recent scientific papers on: host/guest chemistry, sensors, molecular devices, auto-assembling systems, biomimetic systems

Detailed program

1) introduction to supramolecular chemistry and host/guest chemistry

2) molecular interactions

3) Analytical methods to study molecular interactions: NMR. mass, fluorescence. ITC, SPR, others...

4) host structures: crown ethers, cryptands, spherands, lariat ethers, calixarenes, cucurbiturils, cyclodextrins

5) molecular sensors

6) molecular devices

7) conjugation chemistry and click chemistry

Prerequisites

The course is intended for students who have a solid background in chemistry, with an advanced knowledge of organic chemistry. A good knowledge of the analytical methods in organic chemistry is also needed, in particular NMR spectroscopy.

Teaching form

Registered lessons in streaming

Slides and scientific papers online

Development of a personal project

Course in Italian

Textbook and teaching resource

slides (on Moodle)

articles of scientific journals (on Moodle)

textbooks

Semester

second semester

Assessment method

Oral examinations in presence or online

The verification of the achievement of the objectives is carried out using:

for the assessment of the learning outcomes foreseen in fields D1 and D2: final oral exam;

for the assessment of the learning outcomes provided for in field D3 the critical discussion in the class of scientific articles;

for the assessment of the learning outcomes provided for in field D4, the presentation of a personal report on a new drug

Office hours

by email appointment