UNIWERSYTET GDAŃSKI

Course title
Wykład specjalizacyjny - Rozpoznanie molekularne/Graduate study lecture - Molecular identification

ECTS code
13.3.0451

Name of unit administrating study
Faculty

Studies

Field of study	Type	Form	
Chemistry	Master	Full-time studies	

Teaching staff
Dr Paweł Niedziałkowski

Forms of classes, the realization and number of hours

A. Forms of classes, in accordance with the UG Rector's regulations
lecture

B. The realization of activities
In-class learning

Number of hours
lecture 30 h

ECTS credits

classes 30 h
tutorial classes 5 h
student's own work 40 h
TOTAL: 75 h - 3 ECTS

The academic cycle
First year, summer semester

Type of course
obligatory

Language of instruction
Polish

Teaching methods
Lecture with multimedial presentation

Form and method of assessment and basic criteria for evaluation or examination requirements

A. Final evaluation, in accordance with the UG study regulations
Course completion (with a grade)

B. Assessment methods
Test pass with open questions

C. The basic criteria for evaluation or exam requirements
positive mark of the written exam consisting of open and closed questions covering the issues described in the lecture program

Required courses and introductory requirements

a. **Formal requirements** analytical chemistry, inorganic chemistry, organic chemistry and physical chemistry
b. **Prerequisites** knowledge of basic types of reactions occurring in organic and analytical chemistry, nomenclature and characteristics of organic and inorganic compounds

Aims of education

- description to the types of interactions occurring in supramolecular chemistry.
- introduction to the basic methods of synthesis and structures of supramolecular compounds.
- presentation of the structure and nature of the interaction of natural and synthetic receptors participating in the process of molecular recognition
- discussion of the latest achievements in the field of supramolecular chemistry underlying the molecular recognition process

Course contents

Description the basic covalent bonds and non-covalent interactions in the aspect of supramolecular chemistry. Discussion of the basic principles and concepts occurring in supramolecular chemistry. Description of base structure and synthesis of supramolecular systems (molecular devices, molecular machines). Discussion of the latest developments and achievements and in the field of supramolecular chemistry. Phenomenological and molecular interpretation of energy and entropy occurring in the coordination and supramolecular systems. Effects: chelate, macrocyclic, template, preorganization and thermodynamic forces in the coordination and supramolecular chemistry. Self-organization, self-replication and supramolecular catalysis. Supramolecular polymers. Ionophores, chromoionophores and fluoronionophores. Types of organic compounds and functional groups used to the construction of molecular recognition systems. Construction and principles of function of molecular recognition sensors based on electrochemical and spectroscopic detection. Photochemical and photophysical methods of molecular interactions. Selected methods of modification of molecular surfaces with supramolecular systems and the possibility of their practical use.

Bibliography of literature

A. Literature required to pass the course

A.1. Literature used during classes:

1. Kompleksy typu gość-gospodarz, G. Schroeder, Betagraf,
2. Syntetyczne receptory jonowe, G. Schroeder, Betagraf,
3. Syntetyczne receptory molekularne, G. Schroeder, Betagraf,
4. Receptory Supramolekularne, G. Schroeder, Betagraf,
5. Wybrane aspekty chemii supramolekularnej, G. Schroeder, Betagraf,
6. Molecular Recognition: Biotechnology, Chemical Engineering and Materials Applications, Jason A. McEvoy, Nova Science Pub Inc.,
7. Supramolecular Chemistry - Fundamentals and Applications, Katsuhiko Ariga, Toyoki Kunitake, Springer,
8. Introduction to Supramolecular Chemistry, Helena Dodziuk, Springer,
9. Core concepts in Supramolecular Chemistry and Nanochemistry, Jonathan W. Steed,David R. Turner,Karl J. Wallace, John Wiley and Sons,

A.2. Literature for individual studies:

1. Supramolecular Chemistry, Jonathan W. Steed, J. L. Atwood, John Wiley and Sons,
2. Supramolecular Chemistry II - Host Design and Molecular Recognition, Edwin Weber, Springer,

B. Extracurricular readings

1. Chemosensors: Principles, Strategies, and Applications, Binghe Wang, Eric V. Anslyn, Willey,
2. Transition Metals in Supramolecular Chemistry,Jean-Pierre Sauvage, Wiley-Interscience,
3. Modern supramolecular chemistry: strategies for macrocycle synthesis, François Diederich,Peter J. Stang, Rik R. Tyk-winski, Weinheim : Wiley-VCH,
4. The Chemistry of Macrocyclic Ligand Complexes L. F. Lindoy, Cambridge University Press,

Knowledge

1. Defines and identifies the basic interactions occurring in the process of molecular recognition.
2. Classifies and describes the molecular and supramolecular systems occuring in solutions, solids and biological systems.
3. Describes the chemical structure and functioning of molecular devices.
4. Classifies and describe the structure of chemical compounds used for design of molecular recognition sensors based on chemical, electrochemical and spectroscopic detection.
5. Describes the surface modification methods for supramolecular chemistry purposes.

Skills Posses the ability to critically evaluate the results of conducted experiments, observations and / or theoretical calculations.
Social competence 1. Can independently search for information in the chemical literature. 2. Formulates opinions in the fields of the use of supramolecular compounds in medicine and modern technologies. 3. Recognizes the sensors used in everyday life.