University of Gdańsk

Subject card

Subject name and code	Graduate study lecture - Molecular identification, PG_00082262		
Field of study	Chemistry		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	Master's studies	Subject group	Obligatory subject group in the field of study Optional subject group
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	academic	Assessment form	credit
Conducting unit	Laboratory of Electroanalysis and Biosensors -> Department of Analytical Chemistry -> Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Paweł Niedziałkowski	
	Teachers	dr hab. Paweł Niedziałkowski	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						

Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	30	5.0	40.0	75

Subject objectives	
	Introduction to the types of interactions occurring in supramolecular chemistry.Introduction to the basic methods of synthesis and the structure of supramolecular compounds.Presentation of the structure and nature of interaction of natural and synthetic receptors involved in the process of molecular recognition.Discussion of the latest developments in the field of supramolecular chemistry representing the basis of molecular recognition.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	Defines and identifies the fundamental interactions that occur in the molecular recognition process. Classifies and describes molecular and supramolecular systems found in solutions, solids, and biological systems. Describes the chemical structure and function of molecular devices . Classifies and justifies the structure of chemical compounds used to design molecular recognition sensors based on chemical, electrochemical and spectroscopic detection. Describes surface modification methods for supramolecular chemistry.	[SW4] test/exam - oral or written
[CHEMMU2_U02] Critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors.	Possesses the ability to critically evaluate the results of experiments performed, observations made and/or theoretical calculations. Discusses the occurring anomalies in molecular recognition.	[SU4] test/exam - oral or written
[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	Able to independently search for information in the chemical literature. Formulates opinions on the use of supramolecular compounds in medicine and modern technologies. Recognizes sensors used in everyday life.	[SK4] test/exam - oral or written

Subject contents

Discuss basic covalent bonds and non-covalent interactions in terms of supramolecular chemistry. Discussion of basic principles and concepts found in supramolecular chemistry. Attitudes of construction and synthesis of supramolecular systems (e.g.: molecular devices, molecular machines). Discussion of recent developments in supramolecular chemistry. Phenomenological and molecular interpretation of energy and entropy in coordination and supramolecular systems. Effects: chelate, macrocyclic, template, preorganization vs. thermodynamic factors in coordination and supramolecular chemistry. Self-organization, self-replication vs. supramolecular catalysis. Supramolecular polymers. Ionophores, chromoionophores and fluoroionophores. Types of organic compounds and functional groups used in the construction of molecular recognition systems. Construction and principle of operation of molecular recognition sensors based on electrochemical and spectroscopic detection. Photochemical and photophysical methods of molecular interactions. Methods of modification of molecular surfaces with supramolecular systems and the possibility of their practical use.

Prerequisites and co-requisites

Prerequisites: kKnowledge of the basic types of reactions occurring in organic and analytical chemistry, nomenclature and characterization of organic and inorganic compoundsSpecification of other subjects: Completed course in analytical chemistry, inorganic chemistry, organic chemistry and physical chemistry

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
test/exam	51.0%	100.0%

Recommended reading

Basic literature

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,

	Supplementary literature	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, 3. Chemosensors: Principles, Strategies, and Applications, Binghe Wang, Eric V. Anslyn, Willey, 4. Transition Metals in Supramolecular Chemistry,Jean-Pierre Sauvage, Wiley-Interscience, 5. Modern supramolecular chemistry: strategies for macrocycle synthesis, François Diederich,Peter J. Stang, Rik R. Tyk-winski, Weinheim : Wiley-VCH, 6. The Chemistry of Macrocyclic Ligand Complexes L. F. Lindoy, Cambridge University Press,
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. What is supramolecular chemistry.2. What interactions occur in molecular recognition.3. The effect of hydrogen bonding occurring in the environment.	
Work placement	Not applicable	

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