Zał. nr 5 do ZW 16/2020

FACULTY OF CHEMISTRY

SUBJECT CARD

Name of subject in Polish Synteza i wytwarzanie systemów nano-inżynieryjnych
Name of subject in English Synthesis and Fabrication of Nano-engineering Systems
Main field of study (if applicable): Chemical Nano-Engineering
Specialization (if applicable): ……..
Profile: academic
Level and form of studies: 2nd level, , full-time
Kind of subject: obligatory
Subject code …….
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15			
Number of hours of total student workload (CNPS)	60	30			
Form of crediting	Examination	crediting with grade*			
For group of courses mark (X) final course					
Number of ECTS points	2	1			
including number of ECTS points for practical classes (P)		1			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1.4	0.7			

*delete as not necessary

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of organic and inorganic chemistry
2. Basic knowledge of spectroscopic methods

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SUBJECT OBJECTIVES

C1. To provide students with the issues of organic chemistry in nano-engineering systems including bioorganic chemistry
C2. To provide students with the issues of nano-engineering mimetic systems
C3. To provide students with the molecular receptors issues
C4. To provide students with the structure, properties and use of particular groups of compounds used in nano-engineering systems
C6. To acquaint students with scientific literature and literature examples

SUBJECT EDUCATIONAL EFFECTS

related to knowledge:

PEU_W01 – student knows what nano-engineering is and knows the scope of its applicability
PEU_W02 – student knows the properties of particular groups of compounds used in nano-engineering
PEU_W03 – student knows the methods of nanosystems synthesis

PEU_W04 – student knows the types of interactions between molecules and knows what compounds form individual interactions

related to skills:

PEU_U01 - student can find a suitable group of compounds that can be used in nano-engineering systems

PEU_U02 - student can construct complex questions in factographic databases and find and analyze professional literature

PEU_U03 - student can analyze the types of interactions responsible for the interaction of molecules

PEU_U04 - student can distinguish and describe the properties of particular groups of compounds applicable in nano-engineering systems

PEU_U05 - student is able to design a potential receptor or mimetic of a biologically active compound based on the acquired knowledge in nano-engineering systems

related to social competences:

PEU_K01 student is able to work in a group, performing various roles including group leader

PEU_K02 student is ready to critically evaluate his/her knowledge and received content

PROGRAMME CONTENT		
Lecture		Number of hours
Lec 1	Presentation of the general characteristics of the subject	2
Lec 2	Organic chemistry reactions	2
Lec 3	Click chemistry and nano-scaffolds	2
Lec 4	Synthesis, structure, properties and application of rotaxanes and catenanes in nano-engineering systems	2
Lec 5	Synthesis, properties and application of dendrimers in nano-engineering systems	2
Lec 6	Peptide and protein mimetics in nano-engineering systems	2
Lec 7	Cyclodextrins in nano-engineering systems	2
Lec 8	Synthesis, structure, properties and application of cyclophanes in nano-engineering systems	2
Lec 9	Designing, properties and application of calixarenes	2
Lec 10	Mimetics of DNA and RNA nucleic acids in nano-engineering systems	2
Lec 11	Enzyme mimetics - Molecular imprinting polymers	2
Lec 12	Micellar catalysis, liposomes, fatty acid mimetics	2
Lec 13	Construction, properties and application of porphyrins	2
Lec 14	Carbohydrates and their derivatives in nano-engineering systems	2
Lec 15	Receptors for compounds with diol moieties	2
	Total hours	30

Classes		Number of hours
Cl	General characteristics of the subject nano-engineering systems Organic chemistry reactions Click chemistry and nano-scaffolds Synthesis, structure, properties and application of rotaxanes and catenanes in nano-engineering systems Synthesis, properties and application of dendrimers in nano-engineering systems Peptide and protein mimetics in nano-engineering systems Cyclodextrins in nano-engineering systems Synthesis, structure, properties and application of cyclophanes in nano-engineering systems Designing, properties and application of calixarenes Mimetics of DNA and RNA nucleic acids in nano-engineering systems Enzyme mimetics - Molecular imprinting polymers Micellar catalysis, liposomes, fatty acid mimetics Construction, properties and application of porphyrins Carbohydrates and their derivatives in nano-engineering systems	15
	Total hours	15

TEACHING TOOLS USED
Lecture N1 information lecture N2 problem lecture N3 multimedia presentation Classes N8 multimedia presentation

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
P1 (lecture)	PEU_W01-W04	Written test
P2 (classes)	PEU_U01-U05 PEU_K01-K02	Score for multimedia presentation

PRIMARY AND SECONDARY LITERATURE
[1] SOURCE LITERATURE - SCIENTIFIC PUBLICATIONS
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Piotr Młynarz, piotr.mlynarz@pwr.edu.pl