Zał. nr 5 do ZW 16/2020

FACULTY OF CHEMISTRY

SUBJECT CARD

Name of subject in Polish Biofotonika
Name of subject in English Biophotonics
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)	15				15
Number of hours of total student workload (CNPS)	30				30
Form of crediting	Examination				crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	1				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)	0,7				0,7

*delete as not necessary

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Fundamentals of physics.
2. Fundamentals of chemistry
3. Fundamentals of biology on the high school level

\

SUBJECT OBJECTIVES

C1 To provide students with additional knowledge in the field of light-matter interactions
C2 Familiarize students with knowledge about modern use of light in biology and medicine
C3 To provide students with an additional knowledge about materials used in light-related therapies
C4 Familiarizing students with modern biophotonics

SUBJECT EDUCATIONAL EFFECTS

related to knowledge:
PEK_W01 student has a structured, theoretically founded general knowledge covering key issues in the field of light-matter interaction
PEK_W02 student knows new methods of bioimaging
PEK_W03 student knows modern methods of lasers applications in biology and medicine
PEK_W04 student knows the basic methods of application of biosensors

PEK_W06 student knows and understands selected applications of plasmonic nanoparticles
PEK_W07 student knows and understands the perspectives and risks associated with the use of light
PEK_W08 student knows the modern methods of photodynamic therapies
PEK_W09 student has knowledge about photonic biocrystals
PEK_W10 student knows new ways of photoproductions by 3-D technique

related to skills:
PEK_U01 – student can name and define biophotonics. He knows the latest literature on biophotonics. Searching for information on biophotonics from available sources.
PEK_U02 – student knows how to use lasers in biology and medicine
PEK_U03- student is able to name and define advanced equipment used in biophotonics
PEK_U04- student has language skills in the field of biophtonics
PEK_U05- student can name and define biosensors
PEK_U06- student has language skills in the field of biophotonics
PEK_U07- student is able to make a critical analysis of the prospects for the use of biomaterials
PEK_U08- student can name and define new biomaterials
PEK_U09- student knows the latest literature on biomaterials
PEK_U10 - student knows the various applications of DNA
PEK_U11 – student can give an example of biosensor
PEK_U12 - student knows bio-derivatives for photonics and material engineering
PEK_U13- student can define photonic biocrystals
PEK_U14 - student knows the 3-D printing technique with light

related to social competences:
PEK_K01student understands the need to inform the public about the need to achieve the goals of sustainable development in technologies for the production of new materials, energy and environmental protection.
PEK_K02 student is able to work in a group, performing various roles including group leader.
PEK_K03 student is aware of the social role of the engineer.
PEK_K04 student is ready to critically evaluate his/her knowledge and received content.

PROGRAMME CONTENT		
Lecture		Number of hours
Lec 1	Fundamentals of light-matter interactions Principles of lasers, current laser technology. Bioimaging – principles, techniques and applications. Principles of biosensors. Plasmonic nanoparticles for cancer detection and treatment. Light activated therapies, photodynamic therapy. Photonic biocrystals. Biocompatible materials for photonics - 3-D printing of new biomaterials.	15
	Total hours	15

Seminar	**Number of hours**

Semin 1	Plasmonic nanoparticles for cancer detection and treatment Biomaterials for photonics Nonlinear bioimaging Photonics crystals in nature Photodynamic therapy Biosensors in practice Advances in 3-D printing for medicine Bioimaging in therapies	15
	Total hours	15

TEACHING TOOLS USED
N1. Multimedia presentation N2. Lectures N3. Hands-on experiments discussed during lectures. N4. Scientific reports

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 seminars	PEU_W01-W10	test
P2 lecture	PEU_U01-U14 PEU_K01-K04	presentations assessment

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Paras N. Prasad, Nanophotonics, Wiley-Interscience, 2004

[2]Challa Kumar, Nanomaterials for Medical Diagnosis and Therapy, Wiley, 2007
[3] Yoon Yeo, Nanoparticulate drug delivery systems : strategies, technologies, and applications, Wiley, 2013
[4] Paras N. Prasad, Introduction to biophotonics, Wiley-Interscience; 2003
[5] Ruikang K. Wang, Valery V Tuchin ,Advanced Biophotonics: Tissue Optical Sectioning, CRC Publishing, 2013

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Katarzyna Matczyszyn, katarzyna.matczyszyn@pwr.edu.pl