

FACULTY of Chemistry

SUBJECT CARD**Name of subject in Polish Biofotonika****Name of subject in English Biophotonics****Main field of study (if applicable): Advanced Nano and Biomaterials - MONABIPHOT****Specialization (if applicable):****Profile: academic****Level and form of studies: 2nd level, full-time****Kind of subject: obligatory****Subject code W03ANB-SM2003W, W03ANB-SM2003S****Group of courses NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	20	30		30
Number of hours of total student workload (CNPS)	30				30
Form of crediting (Examination / crediting with grade)	C				C
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical classes (P)					2
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	0,65				1,4

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. General chemistry
2. Basics of physics
3. Basics of biology at high school level

SUBJECT OBJECTIVES

C1 Obtaining additional knowledge in the field of synthesis, characterization and application of materials for biophotonics

C2 Knowledge about modern biophotonics

C3 Obtaining additional knowledge about materials used in biophotonics

C4 To familiarize the student with modern biophotonics

C5 Knowledge about the development and limitations of biophotonics

SUBJECT EDUCATIONAL EFFECTS

In terms of knowledge:

Person who passed the subject:

PEU_W01 – Has structured, theoretically based general knowledge covering key issues in the field of biophotonics
 PEU_W02 – Knows new methods of synthesizing materials for biophotonics
 PEU_W03- Knows modern methods of material characterization for biophotonics
 PEU_W04- Knows the basic methods of functionalization of materials for biophotonics
 PEU_W05 - Understands and is able to explain descriptions in biophotonics
 PEU_W06- Knows and understands selected applications of materials for biophotonics
 PEU_W07- Knows and understands the prospects and threats related to the synthesis and application of materials for biophotonics
 PEU_W08 – Knows modern methods of dynamic phototherapy
 PEU_W09 – Has knowledge of the toxicity of nanobiomaterials
 PEU_W10- Knows the applications of DNA in biophototics
 PEU_W11 – Knows new methods of biosynthesis of nanomaterials
 PEU_W12 – Knows popular biopolymers and their applications
 PEU_W13 – Has knowledge about photonic biocrystals

In terms of skills:

Person who passed the subject:

PEU_U01 – Is able to name and define biophototics. Knows the latest literature on biophotonics. Searches for information in the field of biophotonics from available sources.
 PEU_U02 - Knows modern imaging methods
 PEU_U03- Is able to name and define advanced equipment used in biophototics
 PEU_U04- Has language skills in the field of biophotonics.
 PEU_U05- Is able to name and define biophotonic materials.
 PEU_U06- Has language skills in the field of biophotonics.
 PEU_U07- is able to critically analyze the prospects for the use of biophotonics
 PEU_U08 - Is able to name and define new biomaterials
 PEU_U09- Knows the latest literature on biophotonics
 PEU_U10 – Knows various applications of photodynamic therapy
 PEU_U11 – Can give an example of a biosensor
 PEU_U12 – Knows biobased materials for photonics and materials engineering
 PEU_U13 - Is able to define photonic biocrystals
 PEU_U14 – Knows the 3-D printing technique for biomaterials

PROGRAMME CONTENT

	Lecture	Number of hours
Lec 1	Fundamentals of light-matter interactions.	2
Lec 2	Principles of Lasers, Current Laser Technology and Nonlinear Optics	2
Lec 3	Bioimaging – principles, techniques and applications	2
Lec 4	Principles of biosensors	2
Lec 5	Plasmonic nanoparticles for cancer detection and treatment	2
Lec 6	Light activated therapy – photodynamic therapy	2
Lec 7	Photonics biocrystals	2

Lec8	Biocompatible materials for photonics – 3-D printing of new biomaterials.	1
Seminar		Number of hours
Semin 1	Bioimaging	2
Semin 2	Bioimaging in therapies	2
Semin 3	Biosensors	2
Semin 4	Biosensors in practice	2
Semin 5	Plasmonic nanoparticles for cancer detection and treatment	4
Semin 6	Photodynamic therapy	2
Semin 7	Antibacterial photodynamic therapy	2
Semin 8	Photonics crystals in nature	4
Semin 9	Advances in 3-D printing for medicine	4
Semin 10	Biomaterials for photonics	4
Semin 11	Nonlinear bioimaging	2
	Total hours	30

TEACHING TOOLS USED

N1. N1 Multimedia lectures
N2 Workshop seminars
N3 Own work – preparation of a presentation/paper
N2.
N3.

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
F1 - lecture	PEU-W1 to W13	Presentation /lecture
F1 (wykład)		
F1 = P1 (seminarium)	PEU-W1 do W13, PEU-U1 do U14	Presentation

P

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] [1] M. Jürge, T. Mayerhöfer, and J Popp Handbook of biophotonics, Wiley 2013

SECONDARY LITERATURE:

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

[2] Paras N. Prasad, Introduction to Biophotonics, 2004

[3] Challa Kumar, Nanomaterials for Medical Diagnosis and Therapy, Wiley, 2007

[4] Yoon Yeo, Nanoparticulate drug delivery systems : strategies, technologies, and applications, Wiley, 2013

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

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