



Subject card

Subject name and code	Photophysics of biological systems, PG_00046105						
Field of study	Technical Physics						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			1.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Instytut Fizyki i Informatyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Marcin Dampc				
	Teachers		dr inż. Marcin Dampc				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=10282							
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	15	1.0		9.0		25
Subject objectives	The interactions between electromagnetic radiation and biological systems will be presented and discussed. Biological systems will be represented by wide range of systems from isolated biomolecules to macroscopic systems. Phenomena of radiation absorption and emission will serve as a foundation for further discussion of photochemistry in biosystems.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W03] Has general knowledge of current development paths and discoveries in the scope of physics and related fields of science and technology.		Can select the appropriate experimental technique for investigating phenomena.		[SW1] Assessment of factual knowledge		
[K7_W02] Has enhanced, theoretically-founded, detailed knowledge of selected field of physics, and sufficient knowledge of related fields of science or technology.		Fully understand excitation processes in molecules and atoms.		[SW1] Assessment of factual knowledge			
Subject contents	Radiation interactions with matter. Electronic, vibrational, rotational excitation. Photoionization. Fragmentation. Jabłoński's diagram. Radiation emission. Photochemistry. Multiphoton processes. Femtosecond photophysics. Free radicals. Photosynthesis. Radiation damage to DNA. Bioluminescence. Clinical phototherapies.						
Prerequisites and co-requisites	Introduction to spectroscopy.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Written assessment		50.0%		50.0%		
	Seminar		50.0%		50.0%		
Recommended reading	Basic literature		1. Z. Kęcki "Introduction to molecular spectroscopy" PWN 1975				
			2. P. Suppan Chemistry and light, PWN 1997				
	Supplementary literature		1. B. Mielewska "Biophysics" Wydawnictwo PG, 2015				

	eResources addresses	Adresy na platformie eNauczenie: Fotofizyka układów biologicznych (2024) - Moodle ID: 22485 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22485
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Selection rules for optical transitions. 2. Present and discuss one example of bioluminescence 3. Present and discuss one example of photoisomerisation process with practical application in medicine. 	
Work placement	Not applicable	