GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	PHOTOCHEMISTRY, PG_00064397		
Field of study	Chemistry		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Inorganic Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Agnieszka Pladzyk	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	15.0	45

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	45	2.0	28.0	75

Subject objectives

The objective of this course is for students to acquire basic knowledge of the various physical, chemical, and biological processes induced by electromagnetic radiation, to understand their theoretical foundations, and to become familiar with the practical applications of these processes in modern technology, medicine, and environmental protection.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K05] is aware of his/her social role as a graduate of a technical university, particularly in terms of communicating information and opinions to the public, and undertakes to communicate such information in an understandable way	is aware of the importance of photochemical phenomena in modern technology, medicine, and environmental protection, and is able to present these topics clearly in a presentation, providing accurate information about their impact on society	[SK4] Assessment of communication skills, including language correctness
[K6_U06] analyses the operation of equipment, apparatus and process lines used in laboratories and the chemical industry	is able to describe and analyze the operation and functioning of radiation sources, photochemical reactors, and measuring equipment used in laboratory photochemical research and in industry.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
[K6_U01] gathers information from literature, databases and other sources, interpreting, critically evaluating, summarising, formulating and justifying opinions, independently analyses and produces technical drawings with the use of computer assistance	is able to compile and present in a seminar the current state of knowledge in a selected area of photochemistry, based on independently sourced and critically analyzed literature and databases, justifying his or her position and independently creating diagrams and drawings using computer-aided tools	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task
[K6_W03] demonstrates knowledge in the area of theoretical chemistry and related engineering disciplines, necessary to predict structures, design and conduct basic process operations using molecular mechanics tools	demonstrates knowledge of theoretical chemistry in the areas of excited states of molecules, the interaction of light with matter, and the analysis of photochemical reaction mechanisms, as well as an understanding of technological processes that utilize light, which provides the foundation for independently designing technological processes based on photochemistry.	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture

1. Basic photochemical principles and concepts: electron excited states, the Franck–Condon rule, the Jabłoński diagram, selection rules, and the quenching of excited states.
2. Photochemical reactions in solutions, quantum yield of photochemical reactions, and actinometry.
3. Atmospheric photochemistry.
4. Applied photochemistry - industrial photochemical syntheses, photochromism, photolithography, OLEDs, optical brighteners.
5. Photochemistry and polymers - photopolymerization and photodegradation of polymers, photoinitiators for polymerization.
6. Photochemical methods of solar energy storage.
7. Photochemistry in biology and medicine - the process of vision, UV filters, phototherapy.
8. Applications of photochemical processes in environmental protection.

Course content – seminar

The seminar covers topics related to the practical application of electromagnetic radiation in technology, everyday life, and scientific laboratories. As part of the seminar, students independently select a topic from a proposed list, prepare and deliver a presentation, and then lead a group discussion on the topic with the entire class.

Prerequisites and co-requisites

Knowledge of subjects: physics, inorganic chemistry, organic chemistry, physical chemistry, biochemistry

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
seminar: multimedia presentation of given problem	60.0%	50.0%
lecture: written test	60.0%	50.0%

Recommended reading

Basic literature	1. Paul Suppan "Chemia i światło" PWN Warszawa 1997. 2. Stefan Paszyc "Podstawy fotochemii" PWN Warszawa. 1992 3. "Fotochemia polimerów. Teoria i zastosowanie" Praca zbiorowa pod red, J. Pączkowskiego Wydawnictwo UMK 2003. 4. Zofia Stasicka "Procesy fotochemiczne w środowisku" Wydawnictwo UJ 2001. 5. Recent articles and scientific publications on photochemical processes
Supplementary literature	1. C. E. Wayne, R. P. Wayne "Photochemistry" Oxford University Press 2005. 2. Nicholas J. Turro "Modern Molecular Photochemistry" University Science Books, CA 1991 3. J. A. Baltrop, J. D. Coyle "Fotochemia, Podstawy" PWN Warszawa 1987.
eResources addresses	

Example issues/ example questions/ tasks being completed	1. Jablonski diagram 2. Types of quenching of excited states 3. Photochemical processes occurring in the atmosphere 4. Photodegradation and photostabilization of polymers 5. Removal of environmental pollution using photochemical processes
Practical activites within the subject	Not applicable

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