GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Production of photonic nanostructures, PG_00069771		
Field of study	Wytwarzanie nanostruktur fotonicznych		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Specialty 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	10.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Wojciech Sadowski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	60.0	0.0	45.0	15.0	0.0	120

E-learning hours included: 0.0

Additional information:

Zajęcia wykładowe, laboratoryjne i projektowe prowadzone w Instytucie Wysokich Ciśnień PAN w Warszawie, prof. dr hab. Czesław Skierbiszewski

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	120	15.0	115.0	250

Subject objectives

The aim of the course is to familiarize students with the properties and selected methods of obtaining photonic nanostructures.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U07] can apply the obtained specialist knowledge to the problems within exact sciences, natural or technical sciences.	The student is able to apply the acquired specialist knowledge to issues from other exact sciences, natural sciences or technology.	[SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu
[K7_W06] Has extended knowledge on the methodology of physics laboratory work, supported with experience in laboratory work. Knows the rules of occupational health and safetyto a degree sufficient for independent work at a research and measuring position.	The student has extended knowledge of the methodology of work in a physics laboratory, supported by experience in laboratory work.	[SW1] Ocena wiedzy faktograficznej
[K7_U06] can plan and conduct theoretical and numerical calculations, simulations of phenomena and processes, critically analyze their results, draw conclusions and formulate reasoned conclusions – within their specialization.	The student is able to plan and carry out theoretical and numerical calculations and simulations of phenomena and processes, critically analyze their results, draw conclusions and formulate motivated opinions.	[SU2] Ocena umiejętności analizy informacji
[K7_U05] can plan and conduct experimental and critical research and analyze their results, draw conclusions and formulate reasoned conclusions – within their specialization.	The student is able to plan and conduct experimental research and critically analyze their results, draw conclusions and formulate motivated opinions - within the scope of the specialty	[SU4] Ocena umiejętności korzystania z metod i narzędzi
[K7_W04] has practical and theoretical knowledge of physical and chemical experimental methods of nanotechnology.	The student has practical and theoretical knowledge of physical and chemical experimental methods of nanotechnology.	[SW1] Ocena wiedzy faktograficznej

Subject contents

Course content – lecture
Introduction to photonics.
Optics of photonic crystals,
Diffraction optics and plasmonics.
Plasmonic structures based on metal nanoalloys.
Information optics methods.
Fiber optics.
Metamaterials, metalenses.
Integration of electronic and photonic systems. Photonic integrated circuits.
Photonic applications.
Telecommunications applications,

Course content – laboratory
Studies of optical properties of selected crystal structures.
GaN and InGaN based displays.

Course content – project
Testing the properties of optical sensors and displays.
Design of photonic structures.
Application of selective etching methods for GaN structures.
Integration of functional photonic elements with electronic elements.

Prerequisites and co-requisites

Passed all 1st and 2nd semester subjects in the fields of Technical Physics, Nanotechnology or Materials Engineering at the Faculty of FTiMS

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Completion of the project	100.0%	10.0%
Passing the laboratory	100.0%	40.0%
Passing the lecture	60.0%	50.0%

Recommended reading

Basic literature	Springer Handbook of Electronic and Photonic Materials. 2017. Semiconductor Devices Physics and Technology. S. M. SZE, M. K. LEE. JOHN WILEY & SONS, INC. 2012
Supplementary literature	Nanophotonics. 2018, Springer Integrated Nanophotonics: Platforms, Devices, and Applications. 2023 WileyVCH GmbH.
eResources addresses	

Example issues/ example questions/ tasks being completed

Optics of photonic crystals.
Diffraction optics and plasmonics.
Information optics methods.
Fiber optics.
Metamaterials, metalenses.
Photonics and telecommunications applications,

Practical activites within the subject

Not applicable