GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fundamentals of Photonics Physics, PG_00048683		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	February 2024	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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	1.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Metrology and Optoelectronics -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marcin Gnyba	
	Teachers	dr hab. inż. Marcin Gnyba dr hab. inż. Robert Bogdanowicz	

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

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	2.0	8.0	25

Subject objectives

Understanding the impact of building materials on their properties in the optical band. Understanding the principles of selected photonic devices.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W02] Knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study	1. Knowledge of selected non-linear effects in optical materials. 2. Knowledge of selected optical modulators. 3. Knowledge of the operating principles of selected components for integrated optics.	[SW1] Assessment of factual knowledge
[K7_W03] Knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum.	1. Determination of material properties in the optical band based on its structure at the atomic, molecular and crystal structures. 2. Knowledge of properties of particular classes of materials in different sub-ranges of the optical band.	[SW1] Assessment of factual knowledge
K7_K02	1. Ability to identify admixtures or impurities based on changes in the optical characteristics of the material. 2. Ability to choose a method for measuring the thickness of thin-film structures.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents	1. Molecular-crystallographic composition of optical materials and its influence on color of materials. 2. Refractive index and extinction index of metals, semiconductors and dielectrics. 3. Optical properties of the glasses. 4. Optical and electro-optical properties of ceramics. 5. Optical crystals. 6. Properties and application of organic materials. 7. Optical indicatrix. The influence of polarization on the properties of the material. 8. Nonlinear crystals. 9. Optical modulators. 10. Selected elements of integrated optics.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
test	50.0%	100.0%

Recommended reading	Basic literature	1. Drude, P. (1902). The Theory of Optics. New York, Dover Publications, Inc., p. 287-292. 2. R.M.A. Azzam, and N.M.Bashara, Ellipsometry and Polarized Light, North Holland Press,Amsterdam 1977, Second edition, 1987. 3. Tompkins, H. G. , A User's Guide to Ellipsometry. New York, Academic Press, Inc.,1993
	Supplementary literature	1. Spectroscopic Ellipsometry, A.C.Boccara, C.Pickering, J.Rivory, Elsevier Publishing,Amsterdam, 1993.
	eResources addresses	Adresy na platformie eNauczanie: Fizyczne Podstawy Fotoniki 2024 - Moodle ID: 37805 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37805
Example issues/ example questions/ tasks being completed	1. How does material material composition affect its color? 2. What is it and how to determine the optical indicatrix? 3. Use the Lorenz oscillator to describe of the basic properties of main materials groups in the bands of UV, VIS and IR.	
Work placement	Not applicable	