GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Optoelectronics, PG_00047535		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2022/2023
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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	3.0
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 inż. Marcin Strąkowski	
	Teachers	dr inż. Adam Mazikowski dr hab. inż. Paweł Wierzba dr hab. inż. Robert Bogdanowicz dr inż. Marcin Strąkowski prof. dr hab. inż. Małgorzata Szczerska	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	0.0	0.0	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	3.0	27.0	75

Subject objectives

The goal of the course of the Optoelectronics is to enable students of the EiT study of the phenomena and laws of optics, selected optoelectronic components, basic applications of modern measurements methods as well as technological processes and the systems for acquisition and processing of information.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications	The student evaluates the optoelectronic components characteristics and can analyse the coincidencies between themselves.	[SU1] Assessment of task fulfilment
[K6_W03] Knows and understands, to an advanced 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	The student understands and describes basic optical and optoelectronic phenomena. He also understands and analyses the principles of operation and features of optoelectronic components. He can chose correctly the components for optoelectronic system.	[SW1] Assessment of factual knowledge

Subject contents	1. Lecture program, Bibliography, Management of Lecture 2. Optoelectronic System, Devices, Modules 3. Description Methods of Optical Radiation Radiometry and Photome-try 4. Radiometric and Photometric Quantities and Units 5. Propagation of Radiation in Optoelectronic Systems 6. Light Interaction with Matter: Absorption, Transmission, Reflection 7. Radiation Scattering 8. Phenomena on the Boundary Between Optical Media, Fresnels Equa-tions 9. Interference 10. Interferometers, Filters 11. Fabry-Pérot Resonator 12. Applications of Interferometry 13. Light Sources: Thermal, Electroluminescent, VF 14. Light Sources LED 15. Principles of the Laser, Laser Oscillation Conditions 16. Properties of the Laser Beam, Types of Lasers, Applications 17. Laser Diode, Basic LD Characteristics, Parameters, Applications 18. Photodetectors, Thermal Detectors, Photon Detectors (PMT, PIN, APD, CCD, CMOS), Properties, Characteristics, Applications 19. Safety in Optical Setups, Laser Safety 20. Visualization of Information 21. Optical Fibers and their Classification 22. Basic Parameters of Optical Fibers: Numerical Aperture, Acceptance Angle, Attenuation 23. Step-index optical fiber 24. Dispersion in Optical Fibers. Impact on Transmission Properties 25. Gradient-Index Optical Fiber 26. Optical Transmission 27. Single-Mode Optical Fiber and its Basic Properties 28. Optical Time Domain Reflectometry (OTDR) and its Application for Optical Fiber Measurements 29. Passive Optical Components 30. Optoelectronic System Design 31. Optical Sensing 32. Recent Trends in Optoelectronics
Prerequisites and co-requisites	No requirements
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Midterm colloquium	50.0%	60.0%
Execution of the all laboratory exercises	50.0%	40.0%

Recommended reading	Basic literature	1. J. Siuzdak: Wstęp do współczesnej telekomunikacji światłowodowej 2. 1999 B. Ziętek: Optoelektronika, 2004 3. G. Einarsson: Podstawy telekomunikacji światłowodowej, 4. 1998 BEA Saleh, MC Teich: Fundamentals of Photonics, 5. 2007 S. Kasap: Optoelectronics and Photonics, 2001
	Supplementary literature	No requirements
	eResources addresses	Adresy na platformie eNauczanie: Optoelektronika PG_00047535, EiT, I st. sem.04 (2022/23,) - Moodle ID: 26852 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26852
Example issues/ example questions/ tasks being completed	The optical beam principles and methods of its description. The interference, its descriptions and aplications The basic setup, features and applications of the lasers. Optical detectors: principles of operation, classification and features.	
Work placement	Not applicable	