

关。GDAŃSK UNIVERSITY 创 OF TECHNOLOGY

Subject card

Subject name and code	Optoelectronic Components and Circuits, PG_00048095								
Field of study	Electronics and Telecommunications								
Date of commencement of studies	October 2020		Academic year of realisation of subject			2023/2024			
Education level	first-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	4		Language of instruction			Polish			
Semester of study	7		ECTS credits			2.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Department of Metrol	ogy and Optoe	lectronics -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname	Subject supervisor		dr hab. inż. Paweł Wierzba						
of lecturer (lecturers)	Teachers		dr hab. inż. Paweł Wierzba						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
	Number of study hours	15.0	0.0	0.0	15.0		0.0	30	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	n didactic led in study	Participation in consultation hours		Self-study		SUM	
	Number of study hours	30		2.0		18.0		50	
Subject objectives	Provision of knowledge about the principles of operation and key characteristics of selected optoelectronic components and skills needed for correct use of these components and for design of circuits emplying these components.						elected nd for		
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		can perform the analysis of operation of semiconductor sources and detectors of optical radiation, encoders and optocouplers, as well as the circuits working with them.			[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject			
	[K6_W32] Knows the parameters, functions and methods of analysis, design and optimization of analogue and digital circuits and electronic systems		knows principle of operation of semiconductor sources and detectors of optical radiation, encoders and optocouplers, as well as the circuits working with them; designs circuits working with photodiodes, circuits powering LEDs and laser diodes, as well as selected circuits using optical isolation			[SW1] Assessment of factual knowledge			

Subject contents	 Photon and thermal detectors. Spectral characteristics and transduction mechanisms PIN and PN photodiodes design, principles of operation, important electrical and spectral characteristics Detection setups using photodiodes Phototransistors and photoresistors Light Emitting Diodes principles of operation, materials Selected designs of LEDs. Coupling to optical fibres Driving circuits for LEDs. Intensity modulation Optocouplers and optoisolators principles of operation, main types Characteristics and applications of optocouplers Light propagation mechanisms in laser diodes Overview of laser diode designs. Fabry-Perot laser diodes structure and characteristics DFB and DBR Laser diodes structures, characteristics Superluminescent diodes structure and characteristics Remote control systems information coding, implementations Remote control systems example implementations Design of circuits interfacing to detectors Design of circuits using optocouplers Design of circuits using optocouplers 					
Prerequisites and co-requisites	Command of English at a level sufficient to use technical docummentation					
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
and criteria	Project	50.0%	50.0%			
	Midterm colloquium	51.0%	50.0%			
Recommended reading	Basic literature	 T. H. Wilmshurst, Signal recovery from noise in electronic instrumentation, Taylor and Francis, 1990 M. Niedźwiecki, M. Rsiukiewicz, Nleliniowe elektroniczne układy analogowe, WNT Warszawa 1991 S.O. Kasap, Optoelectronics and Photonics 2nd ed., Pearson Education, 2013 P.Horowitz, W. Hill, The art of electronics, 3rd ed. Cambridge University Press 2015. Z. Bielecki, A. Rogalski, Detekcja sygnałów optycznych, wyd. 2, WNT Warszawa 2019 				
	Supplementary literature	No requirements				
	eResources addresses	Adresy na platformie eNauczanie: Elementy i układy optoelektroniczne - 2023 - Moodle ID: 31927 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=31927				
Example issues/ example questions/ tasks being completed		•				
Work placement	Not applicable					