



Subject card

Subject name and code	Semiconductor physics, PG_00069773						
Field of study	Fizyka półprzewodników						
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		4.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Division of Nanomaterials Physics -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Wydział 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	30.0	0.0	15.0	15.0	0.0	60
	E-learning hours included: 0.0						
	Additional information: Zajęcia dydaktyczne prowadzone w Instytucie Wysokich Ciśnień PAN w Warszawie - prof. 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	60		5.0		35.0	100
Subject objectives	The aim of the course is to familiarize students with the basics of semiconductor physics and discuss the main physical properties of this group of materials.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W03] has general knowledge on current development directions and discoveries in physics, chemistry, technology and applications of nanostructures.		The student has knowledge of current directions of development and the latest discoveries in the field of physics, chemistry, technology and applications of nanostructures.		[SW1] Ocena wiedzy faktograficznej		
	[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		

Subject contents	Course content – lecture Lecture: Basics of the band theory of semiconductors. Statistics of electrons and holes in semiconductors. Kinetic phenomena in semiconductors. Metal-semiconductor, semiconductor-semiconductor junctions. Surface phenomena in semiconductors. Optical properties of semiconductors.		
	Course content – laboratory Laboratory: I-U characteristics of the P-N junction. Diodes in rectifier systems. The influence of temperature on semiconductors and the P-N junction. The influence of lighting on semiconductors and the P-N junction. Bipolar transistor in a low-frequency amplifier circuit.		
	Course content – project Design: Semiconductor switching elements. Applications of thyristors. Light detectors. Spectral light sources (LED)		
Prerequisites and co-requisites	Completion of all subjects of the first semester of the second cycle in the field of Technical Physics, Nanotechnology or Materials Engineering.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		100.0%	20.0%
		100.0%	30.0%
		60.0%	50.0%
Recommended reading	Basic literature	A Peter Y. Yu, Manuel Cardona Fundamentals of Semiconductors. Physics and Materials Properties.Safa Kasap, Peter Capper (Eds.). Springer International Publishing AG 2017	
	Supplementary literature	Physics of Semiconductor Devices. Author(s):S.M. Sze, Kwok K. Ng. 2007 John Wiley & Sons, Inc. Semiconductor Material and Device Characterization. Wiley-IEEE Press, 2005	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Practical activites within the subject	Not applicable		

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