

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058864								
Field of study	Nanotechnology								
Date of commencement of studies	October 2023		Academic year of realisation of subject			2024/2025			
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	2		Language of instruction			English			
Semester of study	3		ECTS credits			5.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Institute of Nanotechi	e of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics				matics			
Name and surname	Subject supervisor		dr inż. Michał Winiarski						
of lecturer (lecturers)	Teachers		dr inż. Michał Winiarski						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Project		Seminar	SUM	
of instruction	Number of study hours	30.0	30.0 0.0 0.0		0.0		0.0	60	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	n didactic ed in study	Participation in consultation hours		Self-study		SUM	
	Number of study 60 hours			5.0		60.0		125	
Subject objectives	The aim of the class is to introduce students to the topic of analysis of electronic structure of solids and nanostructures.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	K7_001		Student can perform electronic structure calculations of solids and nanostructures			[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment			
	K7_W02		Student has a deepened knowledge of electronic structure calculational methods			[SW1] Assessment of factual knowledge			
K7_W04			Student understands the possibilities of relating the results of experimental and calculational methods of electronic structure analysis		[SW1] Assessment of factual knowledge				
Subject contents	 Electronic structure of atoms, Atomic models Chemical bonding theories: valence bond theory & molecular orbital theory Methods of ab initio calculations: Hartree-Fock and related methods, density functional theory Tight binding model Analysis of results of electronic structure calculations 								

Prerequisites and co-requisites	Course in modern physics					
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
and criteria	mid-term test	50.0%	50.0%			
	final test	50.0%	50.0%			
Recommended reading	Basic literature Supplementary literature	 (1)Hoffmann, R. How Chemistry and Physics Meet in the Solid State. Angewandte Chemie International Edition in English 1987, 26 (9), 846878. <u>https://doi.org/10.1002/anie.198708461</u>.(2)Marzari, N.; Ferretti, A.; Wolverton, C. Electronic-Structure Methods for Materials Design. <i>Nat. Mater.</i> 2021, <i>20</i> (6), 736749. <u>https://doi.org/10.1038/</u> <u>s41563-021-01013-3</u>. (1)Dronskowski, R. Chemical Bonding: From Plane Waves via Atomic Orbitals; De Gruyter, 2023. 				
	eResources addresses	Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed	Describe briefly the basic ideas of the density functional theory Draw schematically the band structure of a 1D hydren atom chain					
Work placement	Not applicable					

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