



Subject card

Subject name and code	Technology of Photovoltaic Cells, PG_00039480						
Field of study	Technical Physics						
Date of commencement of studies	February 2023	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	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Fizyki Organicznych i Perowskitowych Struktur Fotowoltaicznych -> Instytut Fizyki i Informatyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Damian Głowienka				
	Teachers		dr inż. Damian Głowienka				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	15.0	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		6.0		24.0	75
Subject objectives	To acquaint students with the technology of solar cells						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U07] Has enhanced skill of preparing speeches in Polish and English, including presentation of own research results.		The student is able to develop a specific topic in the field of photovoltaic cell production based on scientific literature		[SU5] Assessment of ability to present the results of task		
	[K7_W05] Knows the theoretical basis of the functioning of physical scientific equipment.		The student knows the basic parameters of photovoltaic cells, types of solar cells, their structures and methods of their productions		[SW1] Assessment of factual knowledge		
Subject contents	Processes involved in energy conversion. Fundamentals of photovoltaic cells. Basic parameters characterizing the solar cell. S-Q limit. Basic parameters limiting the efficiency of solar cells. Construction of single-junction cell. Single-junction cell technology (c-Si, GaAs, CdTe, CIGS, a-Si). Perovskite and organic cells. Multi-junction cells.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	oral presentation		100.0%		40.0%		
	test		50.0%		60.0%		

Recommended reading	Basic literature	<p>[1] W. Shockley, H. Queisser, Detailed balance limit of efficiency of p-n junction solar cells, Journal of Applied Physics 32 (2) (1961) 510-518.</p> <p>[2] P. Würfel, Physics of Solar Cells From Principles to New Concepts, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim 2005.</p> <p>[3] A. Luque, S. Hegedus, Handbook of Photovoltaic Science and Engineering, John Wiley & Sons Ltd, England 2003.</p>
	Supplementary literature	M. Waclawek, T. Rodziewicz, "Ogniwa słoneczne" WNT Warszawa 2011
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. List the types of silicon cells. 2. Present the cell division according to their generation. 3. Present the structure of the organic solar cell. 	
Work placement	Not applicable	