GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00051807		
Field of study	Technical Physics		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Obligatory subject group 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	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Physics of Organic and Perovskite Photovoltaic Structures -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
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	0.0	0.0	30.0	0.0	0.0	30

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 1391 Laboratorium fotowoltaiki
https://enauczanie.pg.edu.pl/2025/course/view.php?id=1391

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	30	3.0	17.0	50

Subject objectives

The course aims to develop skills in measuring and analyzing JV characteristics of various types of solar cells and in the fabrication of dye-sensitized solar cells.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W05] knows the theoretical basis of the functioning of physical scientific equipment	The student understands the theoretical foundations of scientific instrumentation and has mastered the operating principles of the instruments used for the fabrication and characterization of solar cells.	[SW1] Assessment of factual knowledge
[K7_W06] has enhanced knowledge of the experimental methods and techniques applied in physics	The student has an advanced understanding of experimental methods and techniques used in the fabrication of solar cells.	[SW1] Assessment of factual knowledge
[K7_K03] can communicate and present results of own work and transfer information in a commonly understandable manner	The student is able to compile and present results in the form of a scientific report.	[SK4] Assessment of communication skills, including language correctness
[K7_U03] has enhanced laboratory work experience	The student has advanced skills in operating research equipment and applying solar cell fabrication techniques, in accordance with health and safety regulations and good laboratory practice.	[SU4] Assessment of ability to use methods and tools

Subject contents

1. Preparation of the list of required tests and planning of the experimental process in accordance with the research objective.
2. Conducting the fabrication process of dye-sensitized solar cells.
3. Performing electrical measurements.
4. Analyzing the results and drawing conclusions.
5. Preparing a written report.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Knowledge of the fundamental physical phenomena occurring in solar cells. Theoretical knowledge of the basic principles of solar cell operation and fabrication technology is also required. In addition, the student should be able to carry out measurements of electrical quantities, analyze them, and present the results.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Evaluation of a written report on the course of research and its results.</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">[1] W. Shockley, H. Queisser, Detailed balance limit of efficiency of pn junction solar cells, Journal of Applied Physics 32 (2) (1961) 510-518.

[2] P. Würfel, Physics of Solar Cells From Principles to New Concepts, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim 2005.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. Handbook of photovoltaic science and engineering, ed. by Antonio Luque and Steven Hegedus,2011 John Wiley & Sons, Ltd</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">1. Preparation of the list of required tests and planning of the experimental process in accordance with the research objective.
2. Conducting the fabrication process of dye-sensitized solar cells.
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4. Analyzing the results and drawing conclusions.
5. Preparing a written report.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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