



## Subject card

Subject name and code	Energy conversion laboratory II, PG_00037310						
Field of study	Technical Physics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
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	3		Language of instruction		Polish Classes are conducted in Polish, but in the case of foreign students, they are conducted in English.		
Semester of study	5		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Piotr Grygiel				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	1. Application of knowledge in the field of thermodynamics, quantum physics, gas physics, heat transfer and electrical circuit theory to conduct experiments illustrating the functioning of certain renewable energy systems. 2. Ability to plan and perform measurements of physical quantities. 3. Ability to compile and present research results in writing. 4. Ability to critically evaluate research results.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W08] has knowledge of planning and conducting physical experiments, and critical analysis of its results		Has knowledge of planning and conducting experiments in the field of researching the functioning of certain renewable energy systems and the physical principles behind their operation, including critical analysis of the results.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K6_U04] plans and conduct experiments, critically analyzes their results, draw conclusions and forms opinions, has laboratory work experience		Using their experience in laboratory work, they plan and conduct experiments in the field of research into the functioning of certain renewable energy systems and the physical principles underlying their operation, critically analyse the results, and correctly formulate conclusions based on these results.		[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task		
Subject contents	Course content – laboratory Set of experiments: 1. Investigation of a solar battery. 2. Investigation of the emission capacity of bodies with different surfaces as a function of temperature. 3. Investigation of a semiconductor thermogenerator. 4. Investigation of thermoelectric phenomena in metals. 5. Investigation of a solar collector. 6. Comparative studies of absorbers of solar collectors. 7. Heat pump test. 8. Investigation of the solar collector - heat pump assembly. 9. Investigation of fuel cell systems with proton membranes (2 experiments). 10. Examination of the Stirling engine. 11. Investigation of ideal gas transformations. 12. Investigation of a heat pump with Peltier elements. 13. Determination of the value of the thermal insulation coefficient of various materials.						

Prerequisites and co-requisites	1. Knowledge of thermodynamics, quantum physics, gas physics, heat transport and electric circuit theory. 2. Advanced knowledge of methods of analysis of experimental data and calculus of uncertainties.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Acceptance of reports from each exercise according to the schedule	100.0%	50.0%
	Passing the theoretical admission to each exercise according to the schedule	50.0%	50.0%
Recommended reading	Basic literature	P. Grygiel and H. Sodolski, Laboratory of Energy Conversion. A guide for laboratory experiments  1. D. Halliday, R. Resnick, J. Walker, " Fundamentals of Physics", Extended, 10th Edition, Wiley, 2013.  2. J. Larminie i A.Dicks „Fuel cell systems explained"", John Wiley & Sons Ltd., Chichester, 2003.	
	Supplementary literature	1. R. Eisberg, R. Resnick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, John Wiley & Sons Inc, 1985.  2. A. Szlek, M. Wróbel, "Renewable Energy Sources: Engineering, Technology, Innovation", Springer Nature Switzerland AG, 2020	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Describe the operation of a solar cell with a p-n junction and provide the necessary formulas.  2. Derive the formula describing the law of black body radiation and explain its significance in the context of the experiment.		
Practical activites within the subject	Not applicable		

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