



Subject card

Subject name and code	Energy conversion laboratory I, PG_00064047								
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				
Semester of study	5		ECTS credits		1.0				
Learning profile	general academic profile		Assessment form		assessment				
Conducting unit	Department of Physics of Electronic Phenomena -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology								
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Daniel Pelczarski						
	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	<ol style="list-style-type: none"><li>Utilisation of the knowledge of thermodynamics, quantum physics, physics of gases, heat transport as well as theory of electric circuits.</li><li>Ability to plan and perform the measurements of physical quantities.</li><li>Ability to elaborate and present in a written form the results of measurements.</li></ol>								
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 physical experiments in the field of renewable energy sources, as well as of critically analysing their results.		[SW3] Assessment of knowledge contained in written work and projects				
	[K6_W07] has knowledge of the construction and operation of physical instruments, measurement and research equipment		Has basic knowledge of the design and operation of physical instruments, measurement equipment, and research apparatus used in the investigation of various energy conversion systems.		[SW1] Assessment of factual knowledge				
[K6_U04] plans and conduct experiments, critically analyzes their results, draw conclusions and forms opinions, has laboratory work experience		Is able to plan and carry out experiments related to the study of various energy conversion systems, critically analyse the results, draw conclusions, and formulate informed opinions. Has experience in laboratory work.		[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject					

Subject contents	Course content – laboratory The set of experiments: 1. Investigation of a battery of solar cells. 2. Investigation of emissivity of various surfaces as a function of temperature. 3. Investigation of semiconductor thermogenerator. 4. Investigation of thermoelectric phenomena in metals. 5. Investigation of a solar collector. 6. Comparative investigations of absorbers of solar collectors . 7. Investigation of a heat pump. 8. Investigation of a solar collector - heat pump system. 9. Investigation of proton membrane fuel cell systems (2 experiments). 10. Investigation of Stirling engine. 11. Investigation of cycles of an ideal gas. 12. Investigation of a heat pump with Peltier elements. 13. Determination of thermal insulation coefficient of different materials.				
Prerequisites and co-requisites	1. Advanced knowledge of thermodynamics, quantum physics, physics of gases, heat transport, theory of electric circuits. 2. Advanced knowledge of methods for experimental data and error analysis.				
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade		
	Credit for the theory of each experiment	50.0%	50.0%		
	Acceptance of reports on each experiment according to schedule	100.0%	50.0%		
Recommended reading	Basic literature	1. P.Grygiel i H. Sodolski „Laboratorium konwersji energii”, skrypt na prawach rękopisu, Politechnika Gdańsk, 2006.			
	Supplementary literature	1. J.I. Pankove „Zjawiska optyczne w półprzewodnikach”, Wydawnictwa Naukowo - Techniczne, Warszawa, 1974. 2. E. Boeker i R. van Grondelle „Fizyka rodowiska”, Wydawnictwo Naukowe PWN, Warszawa, 2002. 3. J. Godlewski, Generacja i detekcja promieniowania optycznego, Wydawnictwo Naukowe PWN, Warszawa, 1997. 4. R. Eisberg i R. Resnick, „Fizyka kwantowa”, Państwowe Wydawnictwo Naukowe, Warszawa, 1983. 5. S. Szczeniowski „Fizyka do wiadczalna część III”, Państwowe Wydawnictwo Naukowe, Warszawa, 1955. 6. W.M. Lewandowski „Proekologiczne źródła energii odnawialnej”, Wydawnictwa Naukowo - Techniczne, Warszawa, 2002. 7. H.Kaiser „Wykorzystanie energii słonecznej”, Wydawnictwa AGH, Kraków, 1995. 8. J. Larminie i A.Dicks „Fuel cell systems explained”, John Wiley & Sons Ltd., Chichester, 2003.			
	eResources addresses				
Example issues/ example questions/ tasks being completed	1. Investigation of a battery of solar cells. 2. Investigation of emissivity of various surfaces as a function of temperature. 3. Investigation of semiconductor thermogenerator. 4. Investigation of thermoelectric phenomena in metals. 5. Investigation of a solar collector. 6. Comparative investigations of absorbers of solar collectors . 7. Investigation of a heat pump. 8. Investigation of a solar collector - heat pump system. 9. Investigation of proton membrane fuel cell systems (2 experiments). 10. Investigation of Stirling engine. 11. Investigation of cycles of an ideal gas. 12. Investigation of a heat pump with Peltier elements. 13. Determination of thermal insulation coefficient of different materials.				
Practical activites within the subject	Not applicable				

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