



Subject card

Subject name and code	Energy conversion laboratory I, PG_00064047						
Field of study	Technical Physics						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2028/2029	
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	<p>1. Utilisation of the knowledge of thermodynamics, quantum physics, physics of gases, heat transport as well as theory of electric circuits.</p> <p>2. Ability to plan and perform the measurements of physical quantities.</p> <p>3. Ability to elaborate and present in a written form the results of measurements.</p>						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_W04] has advanced knowledge of the principles of experimental design, experimental methods, measurement techniques and scientific equipment used in physics and related sciences, including their life cycle.		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_U04] is able, individually or in a team, to plan and conduct experiments in physics and related fields, including applied computer science or energy engineering, and to analyse and interpret results and formulate conclusions.		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	
	[K6_U08] communicates effectively using specialist terminology in physics and related disciplines, enabling the preparation of reports, publications or presentations, as well as participation in discussion and expression of opinions.		The student is able to communicate the results of measurements and experimental analyses using specialist terminology from physics and energy engineering, by preparing reports and presenting and discussing the results of experiments.			[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment	

Subject contents	<p>Course content – laboratory</p> <p>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.</p>			
Prerequisites and co-requisites	<p>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.</p>			
Assessment methods and criteria	Subject passing criteria		Passing threshold	Percentage of the final grade
	Acceptance of reports on each experiment according to schedule		100.0%	50.0%
	Credit for the theory of each experiment		50.0%	50.0%
Recommended reading	Basic literature		1. P.Grygiel i H. Sodolski „Laboratorium konwersji energii”, skrypt na prawach rękopisu, Politechnika Gdańska, 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	<p>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.</p>			
Practical activities within the subject	Not applicable			

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