



Subject card

Subject name and code	Energy conversion laboratory I, PG_00037291						
Field of study	Laboratorium konwersji energii I						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2025/2026		
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		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Wydział Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Daniel Pelczarski				
	Teachers		dr inż. Piotr Grygiel dr inż. Daniel Pelczarski				
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						
	eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=47074 Moodle ID: 47074 Laboratorium konwersji energii 1_2025/2026 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=47074						
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		5.0		30.0	50
Subject objectives	1. Utilisation of the knowledge of thermodynamics, quantum physics, physics of gases, heat transport as well as theory of electric circuits. 2. Ability to plan and perform the measurements of physical quantities. 3. Ability to elaborate and present in a written form the results of measurements.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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, measuring equipment, and research apparatus used in the study of various energy conversion systems.	[SW1] Ocena wiedzy faktograficznej
	[K6_U04] Can plan and conduct experiments, critically analyze their results, draw conclusions and form opinions. Has laboratory work experience.	Able to plan and conduct experiments in the field of research on various energy conversion systems, critically analyze results, draw conclusions, and formulate opinions. Has experience in laboratory work.	[SU1] Ocena realizacji zadania [SU2] Ocena umiejętności analizy informacji [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu
	[K6_W08] Has knowledge of planning and conducting physical experiments, and critical analysis of its results.	Has knowledge in planning and conducting physical experiments in the field of renewable energy sources and in critically analyzing their results.	[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym
Subject contents	[K6_W12] Knows basic health and safety rules.	Knows the basic principles of health and safety at work when conducting research on various energy conversion systems.	[SW1] Ocena wiedzy faktograficznej
	Course content – laboratory Sets of experiments:		
	1. Investigation of a solar battery. 2. Investigation of the emissivity of bodies with different surfaces as a function of temperature. 3. Investigation of a thermoelectric generator. 4. Investigation of thermoelectric phenomena in metals. 5. Investigation of a solar collector. 6. Comparative study of solar collector absorbers. 7. Investigation of a compressor heat pump. 8. Investigation of a solar collector heat pump unit. 9. Study of fuel cell systems with proton exchange membrane. 10. Investigation of a Stirling engine. 11. Investigation of ideal gas transformations. 12. Investigation of a heat pump with Peltier elements. 13. Determination of the thermal insulation coefficient of various 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 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 środowiska”, 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	According to the experiment list.	
Practical activities within the subject	Not applicable	

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