



## Subject card

Subject name and code	Energy conversion laboratory I, PG_00037291						
Field of study	Technical Physics						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
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	Instytut Fizyki i Informatyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Daniel Pelczarski					
	Teachers	dr inż. Daniel Pelczarski					
Lesson types and methods of instruction	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	5.0		30.0		50
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_W08	Possesses the knowledge of planning and conducting a physical experiment in the field of renewable energy sources and the critical analysis of its results.			[SW3] Assessment of knowledge contained in written work and projects		
	K6_U04	Can plan and conduct experiments in the field of research of various energy conversion systems, critically analyze their results, draw conclusions and formulate opinions. Has experience in laboratory work.			[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject		
	K6_W07	Possesses the basic knowledge of the construction and operation of physical instruments, measurement and research equipment used for testing various energy conversion systems.			[SW1] Assessment of factual knowledge		
	K6_W12	Knows the basic principles of occupational health and safety while testing various energy conversion systems			[SW1] Assessment of factual knowledge		

Subject contents	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
	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 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	Podstawowe <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34233">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34233</a> - Adresy na platformie eNauczanie: Laboratorium Konwersji Energii I - 2023/2024 - Moodle ID: 34233 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34233">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34233</a>	
Example issues/ example questions/ tasks being completed	According to the experiment list.		
Work placement	Not applicable		