GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Energy conversion laboratory II, PG_00037310		
Field of study	Technical Physics		
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	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 -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Piotr Grygiel	
	Teachers	dr inż. Piotr Grygiel	

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

eNauczanie source addresses:

Moodle ID: 1061 Laboratorium konwersji energii II
https://enauczanie.pg.edu.pl/2025/course/view.php?id=1061

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 transport and the theory of electric circuits.

2. Ability to plan and measure physical quantities.

3. Ability to develop and present the results of research in writing.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U04] Can plan and conduct experiments, critically analyze their results, draw conclusions and form opinions. Has laboratory work experience.	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	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_W12] Knows basic health and safety rules.	Knows the basic principles of occupational health and safety while testing various energy conversion systems	[SW1] Assessment of factual knowledge
[K6_W08] Has knowledge of planning and conducting physical experiments, and critical analysis of its results.	Possesses the knowledge of planning and conducting a physical experiment in the field of renewable energy sources and the critical analysis of its results	[SW1] Assessment of factual knowledge

Subject contents	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. Advanced 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
Passing the theoretical admission to each exercise according to the schedule	50.0%	50.0%
Acceptance of reports from each exercise according to the schedule	100.0%	50.0%

Recommended reading

Basic literature	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.
Work placement	Not applicable

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