GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Renewable energy seminar II, PG_00037312		
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 Classes can be conducted in Polish or English, depending on the students' preferences. Bilingual classes are available for foreign students.
Semester of study	6	ECTS credits	1.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Molecular Photophysics -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Piotr Grygiel	
	Teachers	dr inż. Piotr Grygiel	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	0.0	0.0	15.0	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

Strengthening and systematizing the knowledge acquired during the lectures and learning its presentation by delivering a lecture on a given topic.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K05] Can present own work results, transfer information in a commonly understandable manner, communicate and self-evaluate, as well as constructively evaluate the effects of other persons' work.	They are able to present the results of their work, convey information in a generally understandable way, communicate, self-assess and constructively evaluate the work of others during seminars - in the context of the broadly understood issues of renewable energy sources and renewable energy (basics of operation, types, operational problems, development prospects).	[SK2] Assessment of progress of work [SK4] Assessment of communication skills, including language correctness
[K6_U08] Can prepare written works and speeches in Polish and English, concerning detailed issues of physics and related fields, and scientific disciplines.	He has the ability to prepare oral presentations in Polish and English on issues related to renewable energy and renewable energy sources (basics of operation, types, operational problems, development prospects).	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task

Subject contents

Course content – seminar
Presentation on a selected topic. Suggested topics:

1. Liquid solar collector farm as a source of renewable energy.
2. Designing liquid collector systems.
3. Solar steam generation systems.
4. Fuel cell cogeneration systems and analysis of a selected system.
5. Fuel cells in vehicle propulsion systems and analysis of a selected system.
6. Methods of obtaining geothermal energy and its use.
7. Analysis of an example system for obtaining geothermal energy.
8. Use of biomass for heat production.
9. Heat storage systems.
10. Operation of a wind power plant and its interaction with the power system.
11. Wind farms, their operational problems, impact on the energy system, its stability and energy quality.
12. Economic aspects of wind power plant operation.
13. Design of wind generator systems.
14. Impact of wind power plants on the environment.
15. The functions of hydroelectric power plants in the power system.
16. Operational problems of hydroelectric power plants: cooperation of generators with the power grid, distributed generation and energy storage.
17. The impact of hydroelectric power plants on the environment.
18. Off-grid photovoltaic systems.
19. On-grid photovoltaic systems.
20. Designing photovoltaic installations.
21. Solar radiation concentrating systems.
22. Hybrid PV/T systems.

Note: it is possible to propose your own topics after prior consultation with the course instructor.

Prerequisites and co-requisites

Basic lecture in physics in the field of mechanics, thermodynamics, electricity and magnetism, lecture on renewable energy sources as well as water-, wind energy and fuel cells.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Assessment of the oral presentation.	50.0%	100.0%

Recommended reading

Basic literature

1. J. F. Manwell, J. G Mc Gowan, A. L. Rogers, Wind Energy Explained. Theory, Design and Application. John Wiley & Sons, Ltd, 2009
2. A. Luque , S. Hegedus , Handbook of photovoltaic science and engineering, Wiley 2003.
3. S.A. Kalogirou, Solar Energy Engineering Processes and Systems, Elsevier Inc., 2014.
4. A.J. Dicks, A.L.Rand, Fuel Cell Systems Explained, 2018 John Wiley & Sons Ltd.

Supplementary literature

1. T. Burton, N. Jenkins, D. Sharpe, E. Bossanyi, Wind Energy Handbook, Willey & Sons Ltd., 2011
2. J. Nelson , The physics of solar cells , ICP, 2003.
3. K.M. Illyas, Fundamentals of Power Plant Engineering: Performance and Operation, LAP Lamberg Academic Publishing, 2018.

eResources addresses

Example issues/ example questions/ tasks being completed

As in the list of proposed topics.

Practical activites within the subject

Not applicable

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