GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Renewable energy seminar I, PG_00037311		
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	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. Daniel Pelczarski	
	Teachers		

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

To consolidate and systematize the knowledge acquired during lectures and learn how to present it by delivering a lecture on a given topic.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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.	Has the ability to prepare oral presentations on a selected topic.	[SU1] Assessment of task fulfilment
[K6_K03] demonstrates readiness to perform professional roles responsibly, adhere to ethical principles and ensure occupational safety.	The student is prepared to responsibly prepare and present studies in the field of renewable energy and to participate in discussions, with respect for ethical principles, scientific integrity, and responsible use of information.	[SK4] Assessment of communication skills, including language correctness [SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice

Subject contents	Course content – seminar Presentation topics: 1. Energy generation methods. Directions of renewable energy development 2. Hydropower. 3. Wind energy. Wind farm design. 4. Photovoltaics - inorganic cells. 5. Photovoltaics - organic cells. 6. Photovoltaics - dye-sensitized solar cells. 7. Photovoltaics - perovskite cells. 8. Solar radiation angles and tracking systems. 9. Photovoltaics - multijunctions and radiation concentrators. 10. Practical aspects of photovoltaics. 11. Photovoltaic installations - modules, off-grid and on-grid systems . Elements of a PV installation. 12. Overview of the largest PV installations in Poland. 13. Prospects for the development of photovoltaics. 14. PV/T hybrid systems. 15. Solar collectors. 16. Biofuels - biomass and biogas. 17. Geothermal energy. 18. Heat pumps. 19. Renewable energy sources in building sector. 20. The concept of a self-sufficient building powered by renewable energy sources. 21. Energy storage - cells, batteries and accumulators. 22. Hydrogen energy - fuel cells. 23. New energy sources for transportation. 24. Environmental pollution related to renewable energy sourcrs.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="2">Knowledge of mechanics, electricity and magnetism, quantum physics, and thermodynamics, within the scope of the basic academic course.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Assessment of the oral presentation: the content and the manner of its presentation.</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. S. C. Capareda, Introduction to Renewable Energy Conversions-CRC Press 2019.

2. M.A.Hanif, F. Nadeem, R. Tariq, U. Rashid, Renewable and Alternative Energy Resources, Academic Press 2021.

3. D. Ginley, D. Kahen, Fundamentals of materials for energy, Cambridge University Press 2011.</td></tr>
<tr><td>Supplementary literature</td><td>1. T.K. Ghosh, M.A. Prelas, Energy resources and systems, vol.2: Renewable Resources, Springer 2011.

2. J-C. Sabonnadiere, Renewable Energies, Wiley 2009.

3. J. Twidell, T. Weir, Renewable Energy Resources, Taylor & Francis 2005.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1) Preparation and presentation of studies on selected renewable energy technologies, in particular hydropower, wind energy, photovoltaics (various types of solar cells), geothermal energy, biomass, and biogas.

2) Analysis of the construction, operating principles, and applications of renewable energy systems, including photovoltaic installations (on-grid and off-grid), hybrid systems, and energy storage.

3) Evaluation of the efficiency, limitations, and development prospects of renewable energy technologies, including a review of current investments and trends.

4) Analysis of the application of renewable energy in buildings and transport, including the concept of energy self-sufficient buildings.

5) Discussion of the environmental impact of renewable energy sources and challenges related to their implementation.

6) Participation in discussions and formulation of opinions on the analysed topics.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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