GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Effective energy use in nuclear power technologies, PG_00065900		
Field of study	Nuclear Engineering		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Specialty 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jan Wajs	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	0.0	15.0	30

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	30	5.0	15.0	50

Subject objectives

Presentation of possible solutions for polygeneration systems based on nuclear power plants for efficient energy management.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W12] identifies and interprets the main developmental trends and significant new achievements in the field of engineering and technical sciences and disciplines relevant to the course of study	identifies directions of development of technologies for generating electricity, heat, cooling, fuels/biofuels	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K7_U14] integrates information obtained from literature and other properly selected sources, including those in a foreign language, creatively interpreting and critically evaluating them, and drawing conclusions	selects a review of literature related to the seminar topic, interprets and evaluates the information obtained; formulates correct conclusions	[SU2] Assessment of ability to analyse information
[K7_U11] communicates and justifies opinions on specialized topics in a manner understandable to diverse audiences, including the use of modern techniques, including information technology	prepares a presentation with the results of work on the selected issue, discusses these results and summarizes	[SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task
[K7_W01] explains and describes, based on general knowledge in the field of scientific disciplines forming the theoretical foundations of Nuclear Power Technologies, the physics of processes, structure, principle of operation, operation, safety aspects, fuels and materials for reactors, systems, machines and devices of a nuclear power plant	explains the principles of operation of polygeneration systems, verifies the applicability of different technologies in the energy system	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td colspan="3">*Lecture*: thermodynamic cycles implemented in nuclear power plants - study of selected cases, the concept of cogeneration and polygeneration, general classification of cogeneration systems, technologies for cooperation with nuclear power plants, district heating based on nuclear energy, hydrogen production, fuel/ biofuel production
Seminar: review of selected polygeneration systems based on nuclear energy; individual student"s work related to the collection and analysis of information about selected system (technical description, principles of operation, characteristics, economic data), which are presented and evaluated during the seminar</td></tr>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">thermodynamics, fluid mechanics, machine design, heat transfer</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>written assessment of the lecture</td><td>56.0%</td><td>65.0%</td></tr><tr><td>seminar</td><td>56.0%</td><td>35.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Amidpour M., Manesh M.H.K.: Cogeneration and polygeneration systems. Elsevier Science Publishing Co INC International Concepts, 2020</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Hani M.R.: et al.: An overview of polygeneration as a sustainable energy solution in the future. Journal of Advanced Research in Fluid Mechanics and Thermal Sciences, vol. 74 (2020), doi:10.37934/arfmts.74.2.85119
Yan X.L., Hino R.: Nuclear hydrogen production. CRC Press, 2011, ISBN: 978-1-4398-1084-2</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">The concept of polygeneration. Construction and application of combined energy systems. Nuclear heat applications.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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